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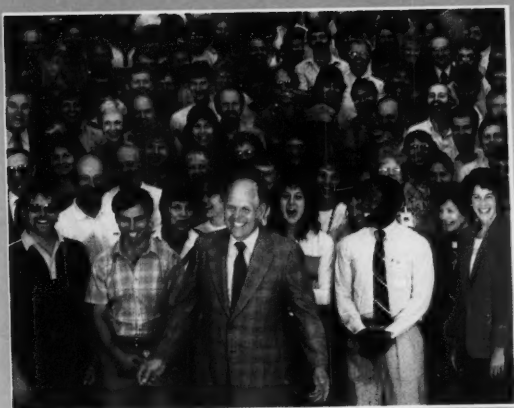
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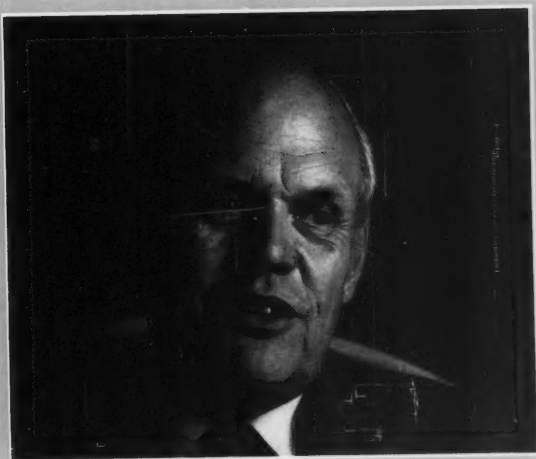
SEPTEMBER 24, 1986



THE YEAR OF DEC

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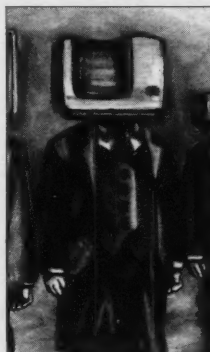
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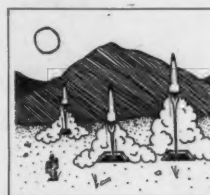
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COMMENT

Can DEC deliver to traditional large MIS shops?

BY FRANCIS GENS

Digital Equipment Corp. continues to expand its image from a scientific/engineering/manufacturing systems supplier — historically selling through indirect channels — to that of a broad market vendor with a much higher percentage of business from direct sales and large accounts.

Users who viewed DEC as a niche supplier are now considering it a contender for office and departmental systems, transaction processing and even production data processing systems.

With DEC bidding for a wider variety of systems, many users are asking if they should consider DEC for applications previously reserved for commercial mainframe vendors like IBM, the plug-compatible companies and the BUNCH group or minicomputer vendors strong in non-DEC markets like Tandem Computers, Inc. The following questions and responses examine DEC's credentials as a systems vendor serving large DP/MIS shops.

How capable is the Vaxcluster for large-scale commercial applications?

The Vaxcluster is an impressive attempt to approximate the performance of large-scale mainframe processors by loosely coupling multiple VAXs (and coordinating some of their activities) on a high-performance star local-area network.

With the exception of Tandem — which actually began implementing multicomputer complexes in the 1970s — DEC is the first supermini vendor to take this approach at the high end.

The Vaxcluster does a good job of providing additional incremental processing power for its current customers by supporting more users, processing power and disk storage. There are, however, some limitations to the current capabilities.

MIS executives considering a clustered approach for large-scale computing needs should be aware of these limitations:

- The VMS operating system and other base system software (in which we include DBMS) has not yet been completely extended to support the Vaxcluster environment. DEC has already provided a distributed lock management, distributed file capability as well as the ability for multiple systems to access a single data base management system.

Still absent, however, are a full distributed DBMS and active distributed data dictionary, more sophisticated recovery (including distributed audit trails) and full parallel processing capability. The goal is to create an operating system view of the cluster as a single logical system.

One of the most important software areas in which DEC still needs to do work is in performance monitoring and management of the Vaxcluster. Tools that aid DP management in traffic analysis, distribution of records on different direct-access storage devices (DASD),

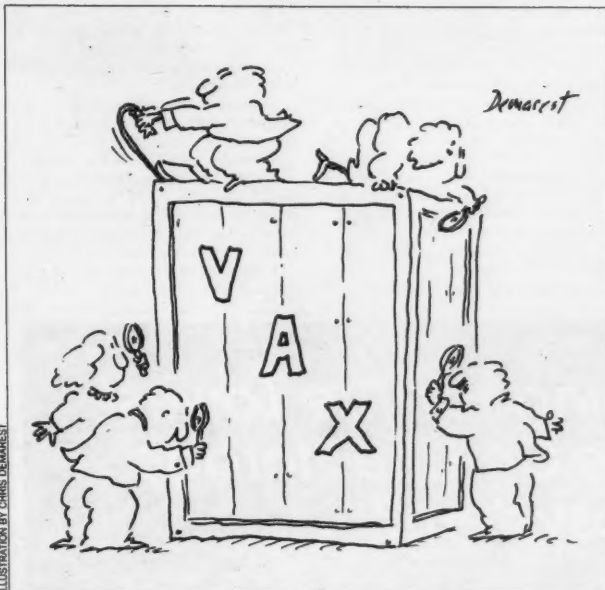


ILLUSTRATION BY CHRIS DEMAREST

maintaining the proper mix of CPUs and storage controllers and so on are critically important for any shop thinking of installing a cluster.

- Since VMS was designed with an orientation toward scientific and engineering time-sharing environments, many components of the operating system — such as queuing and scheduler algorithms — are not optimal for transaction processing applications. Although no benchmarks that compare a Vaxcluster with, for instance, a Tandem VLS system, are available, it is almost certain that the operating system overhead for comparable transaction processing functions is higher for the DEC system.

The point here is that unless DEC chooses to address the on-line transaction processing market with an operating system other than VMS (an idea that is an anathema to DEC's stated philosophy), the company must significantly revise VMS before it can compete. Obviously, modifications to DEC's DBMS to reduce transaction overhead must be made as well. This issue affects not only Vaxclusters but VAXs in general.

- For applications in which large numbers of users access one or more large data bases, accessing data through the cluster (such as a disk not directly attached to the processing CPU) can result in performance degradation. This point has been cited particularly by users who have the new high-end VAX processors that can support more users and therefore stress the DASDs upon which the DBMS resides. Several factors cause this problem, primarily current disk performance limitations.

- For applications accessed by large numbers of users, it may be preferable for application code to reside on a locally attached disk, since page faults that result in disk accesses across the cluster (to disks that are also being accessed by other CPUs) could result in performance degradation.

If a large application is to be run on multiple processors in the cluster, one might need multiple copies of the application (one for each processing CPU).

These issues can be grouped into two broad categories: speed and efficiency (in other words, performance) of communication across the cluster, particularly in applications with large numbers of users accessing large data sets; and system software that makes the Vaxcluster multicomputer architecture transparent to users, applications and cluster components (subsystems).

The first category — cluster performance for large data base applications — will undoubtedly be partially addressed soon with higher performance DASDs. The more difficult part of the performance problem to solve involves modifying operating system algorithms to reflect a more transaction-oriented design point, in the on-line transaction processing environment in particular. Such a project will no doubt require some years to complete.

The second category — more software support for the Vaxcluster — will be addressed on a piece-by-piece basis during the next several years. One of the top items must be better Vaxcluster management tools. Products that go beyond the cluster version of the Monitor package will be introduced during the next one to two years.

Additionally, improvements to the distributed lock management and file systems (for improved concurrency) will continue to be rolled out in the same period. Providing a fully distributed DBMS (and active distributed dictionary) for the Vaxcluster is unquestionably one of the top priorities for DEC. For the company to do it right will likely take two more years. Providing full parallel processing capability for the Vaxcluster, an enormously complex task requiring implementation of a full network VMS, will probably not surface for three to five years.

The bottom line is that the Vaxcluster, while clearly pointing in the right technological direction, is still a somewhat embryonic solution for large-system computing needs. Some of the

shortcomings are relatively easy to fix (high-performance DASD, for example) while others will take some years to fully address (full distributed data base, VMS accommodation of on-line transaction processing). MIS management considering the Vaxcluster as an alternative to a mainframe or more fully developed multicomputer systems should carefully examine if the current limitations of DEC's cluster would affect the target environment.

Does a strong base of third-party software for VAXs exist outside DEC's traditional engineering and manufacturing markets?

The widespread impression is that within the past several years, DEC has established an extensive portfolio of third-party applications in a broad range of industry and horizontal areas, but the supply of outside packages for VAXs is still very much dominated by engineering and manufacturing applications.

As an indicator of the clustering of applications in the engineering and manufacturing areas, "VAX Software Source Book," the 1986 DEC-published directory, lists almost 30% of all VAX packages in engineering and manufacturing. Altogether, engineering, manufacturing and accounting (like word processing, a baseline utility for most systems) applications accounted for nearly 50% of the 1,500-odd packages listed, excluding system tools and utilities like DBMS and languages.

A second group of applications in the distribution, financial management, health care and earth resource areas make up about 25% of the third-party application portfolio.

About 18 other industry areas and generic applications — roughly 25% — make up the remaining application packages. Some areas included in this sparsely represented group are education, personnel, insurance, transportation, utilities, service industries, government, sales and marketing, law, agriculture and construction.

The actual use of applications on installed VAXs is even more strongly tilted toward DEC's traditional markets than the portfolio of available third-party packages. International Data Corp. of Framingham, Mass., estimates that 35% to 40% of all installed VAXs are used for engineering or manufacturing applications, higher than the 30% representation of those applications in the software portfolio.

What do all these numbers mean? While there is undoubtedly a tremendous amount of momentum in the third-party software community to port a broader range of nonengineering and nonmanufacturing applications to the VAX, today the selection of such applications is fairly narrow in some industries.

Customers looking at DEC, particularly in areas such as insurance, transportation, utilities and service industries, must look closely at whether their application and industry are well supported on the VAX.

How tightly can DEC systems be integrated with existing IBM systems?

DEC has aggressively tried to keep

■ CONTINUED ON NEXT PAGE

Gens is a vice-president at International Data Corp., a Framingham, Mass.-based management consulting and market research company.

COMMENT

■ CONTINUED FROM PAGE 5

up with new IBM communications standards. Through DEC's SNA/Gateway and associated software products, VAXs and Decnet networks can work with IBM Systems Network Architecture (SNA) networks and systems almost as intimately as IBM's non-370 processors like the System/36 or Series/1.

Like most vendors, DEC's first link to the IBM world was through cluster controller emulation (LU2). In the past several years, however, IBM has announced a large number of higher level communications links for its own systems, such as LU6.2, SNA Distribution Services, Document Interchange Architecture, Document Content Architecture and Distributed Office Support System (Disoss).

Ironically, many of these interchange tools and architectures, which have pro-

vided better hooks for DEC and others into the IBM environment, were developed by IBM to facilitate communications between its own incompatible systems. DEC has gone well beyond simple cluster controller emulation, consistently being one of the first vendors to announce and deliver support for new high-level IBM-announced links.

DEC's SNA/Gateway support and applications include VMS Advanced Program-to-Program Communications, VMS API, Disoss Document Exchange Facility (DDXF), Distributed Host Command Facility (DHCF) and VMS/SNA (for the Microvax). These products provide a variety of high-level interchange capabilities for VAX networks interfacing to IBM SNA networks.

Additional products that DEC will undoubtedly announce that will further integrate the IBM and DEC environ-

ments include an SQL query facility for DEC's VAX RDB/VMS, support for IBM's Distributed Data Management architecture and PU5 (LU6) SNA support as a subarea SNA host.

Can IBM-oriented operations and development staff skills be leveraged in the DEC environment? For example, are there common application development tools for both IBM and DEC?

In terms of operations, there are few similarities between the VAX and 370 systems. The closest thing to a common operator facility for these two worlds is in the network management area, with DHCF. Installing a DEC system or Vax-cluster in an IBM shop does mean establishing an entirely new core of expertise in VAX hardware and software.

In the application development area, IBM and DEC's third-generation lan-

guages (Cobol, Fortran and so on) are somewhat different. If CICS or TSO tools and facilities are used in the IBM applications, the situation is further complicated. Needless to say, the control languages for each system are very different also. There is a limited number of conversion tools that help port such programs back and forth.

An approach that provides greater leverage of the application development staff is to select a fourth-generation language (and companion DBMS) that both families support. Since fourth-generation languages have remained for the most part in the control of independent software developers, vendors such as

Installing a DEC system in an IBM shop means establishing an entirely new core of expertise in VAX.

Cincom Systems, Inc., Relational Technology, Inc. and Oracle Corp. (and soon, Cullinet Software, Inc.) have attempted to keep their development tools as consistent as possible in a variety of hardware environments.

This means that, with minor exceptions, one can look forward to source-code compatibility for DEC and IBM applications developed with such tools.

Is DEC going to be a survivor in the information systems business during the next 10 to 20 years?

During the past couple of years, DEC has emerged as a clear long-term force in the information systems business. While this conclusion seems trivially simple, it is not; consider that there are several vendors with revenue of more than \$1 billion for which the long-term future — 10 years or more — is not certain.

DEC features a very strong hardware line and a superb network offering in Decnet. One of its biggest current weaknesses is that third-party software support is weak in some key markets, limiting the DEC appeal there.

There is very strong momentum in the software community for porting many packages in a wide variety of industry sectors to DEC systems; however, it will take several years for non-engineering and nonmanufacturing applications to develop.

If DEC can accelerate the modification of its systems (including the Vax-cluster) to accommodate transaction processing environments, there is an excellent opportunity for DEC to challenge IBM and Tandem in this \$20 billion to \$30 billion market. Again, however, this task is not trivial.

Finally, the magnitude of DEC's future success depends heavily on how well the company can overcome its matrix management heritage. Direct sales and support of integrated systems will require a coordinated, account-oriented approach — one that is difficult to superimpose on a product-oriented organization that is used to selling through OEMs.

DEC has undergone two major reorganizations in the past three years in its attempt to address that issue. Old habits die hard, however, and turning DEC into an effective, well-coordinated marketing organization will surely be a multi-year project. ■

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ASK DEC

The following questions were solicited from users by Computerworld Extra and conveyed to DEC for responses.

How is DEC planning to handle the problem of connecting multiple-area Decnets together directly, where there are conflicting area and node assignments that cannot be changed? Will the solution be sooner than two years?
Selden Ball
 Technical Advisor
 Wilson Synchrotron Laboratory
 Cornell University
 Ithaca, N.Y.

As part of Phase IV Digital Network Architecture (DNA), each Decnet node requires a unique area assignment and unique node assignment within areas. To merge two Decnet networks into a single network, it is necessary to identify new area assignments so that each area in the combined network has a unique address.

Today, area assignments can be changed one at a time. In a later phase of Decnet that will conform to the International Standards Organization's (ISO) network layer addressing standards, this limitation will be removed.

With the ISO standard, addresses are up to 20 octets (160 bits) long. The higher order bits designate the domain and can consist of an ISO organization code, a CCITT telephone number and so on. Thus, there is no question of conflict between different networks when merging has to be done.

This question identifies a situation

When will DEC start to produce state-of-the-art disks that match the performance in terms of speed and reliability of the rest of the data processing industry?

— Al Siegel
 Battelle Memorial Institute

that rarely poses a major obstacle in establishing a large network. Internally, for example, DEC has implemented a worldwide system that spans 29 countries and provides some 60,000 users at more than 250 separate locations with access to an integrated Decnet network.

Externally, there are more than 55,000 licensed Decnet nodes and 50,000 licensed Ethernet nodes at 5,500 customer locations that serve 750,000 users.
 William R. Johnson, Jr.
 Vice-President, Distributed Systems

What is DEC's preferred data base solution? Will DEC develop a data base machine? Might one VAX in a cluster become a data base machine?

Herman Gold
 Manager of Technical Services
 A. B. Dick Co.
 Chicago, Ill.

Digital offers two data base products for the VAX family. The first, VAX DBMS, is a full-function, Codasyl-compliant data base management system

that includes an embedded query language.

The second, VAX RDB/VMS, is a full-function, relational data base system. Both products are supported in Vaxclusters and in wide-area networks applications. They are also supported by the VAX Common Data Dictionary and VAX Datatrieve for ease in query and report writing.

These products do work on a Vax-cluster in which you do not need to dedicate a particular VAX to data management.

It is distributed across all VAXs in combination with all the high-speed file access being provided by dedicated disk controllers, the HSC70.

You can have any combination of VAX processors and HSC70 controllers in a Vaxcluster up to a total of 16 devices. This data base management capability is available today.

In addition to the two Digital data base management products noted above, a number of other data base management software packages are offered by independent firms for VAX systems.

These allow the VAX user to pick the data management tool best suited to the application needs.

William Demmer
 Vice-President
 Mid-Range Systems Business Group

What is DEC doing about managing its matrix organization, specifically in the maintenance area? Currently there is often a lot of delay in getting to the correct person. Also, what are you doing to improve your response to software problems? The formal route is often tedious, and it is frequently necessary to use informal routes to get questions answered.

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We also recently opened a new Customer Support Center in Colorado Springs, which we believe to be the most advanced service facility in the world.

This new facility and similar sites worldwide provide Digital customers with the most complete and technologi-

cally sophisticated support services anywhere.

David W. Grainger
 Vice-President, Field Service

When will DEC start to produce state-of-the-art disks that match the performance in terms of speed and reliability of the rest of the data processing industry — specifically the performance of IBM disks? We do not perceive that size is a problem. We are much more interested in reliability and speed.

Al Siegel
 Manager of Computing
 and Telecommunications Center
 Battelle Memorial Institute
 Columbus, Ohio

The performance of an I/O subsystem is affected by several elements in addition to the speed of the various components. Digital Storage Architecture subsystems typically attain throughput about 35% greater than you might expect by just examining component specifications.

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F. Grant Saviers
 Vice-President, Storage Systems

Now that AT&T has dropped support for the VAX with System V, what does DEC plan to do to support System V — incorporate it into Ultrix or use some kind of emulation package on top of it? What are your plans for supporting the IEEE standard for portable operating systems of the Unix type?


John Owens
 Software Analyst
 General Electric Co.
 Charlottesville, Va.

Digital's Ultrix will maintain compatibility with the System V Interface Document Specification as well as with the University of California at Berkeley Unix releases.

For many years, industry standards such as those for Fortran and Cobol have properly been developed and controlled by users and vendors together. Consistent with this, Digital actively supports the IEEE P1003 effort.

Digital provides a computing environment in which VMS and Ultrix systems can be used together easily via Decnet. Furthermore, Transmission Control Protocol/Interconnect Protocol communication capability is provided. Digital has also ported its VAX systems.

For those users who make the transition from Unix systems to VMS, Digital offers the VAX DEC/Shell product, which contains the Bourne shell and many Unix utilities running on VMS.
William J. Heffner
 Vice-President, Software Systems



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CIRCLE READER SERVICE NUMBER 39

NEW PRODUCT REPORT

After Rainbow, Vaxmate: Not just another clone

BY GLENN RIFKIN

Within weeks of the fifth birthday of the IBM Personal Computer, DEC finally unveiled its answer to that now ubiquitous machine. The Vaxmate personal computer, announced earlier this month, is the overdue PC-compatible low-end solution for which DEC users have longed.

Make no mistake, this machine is by no means DEC's first foray into personal computers. The company lost hundreds of millions of dollars on its ill-fated Professional, Rainbow and Decmate II lines, which appeared nearly four years ago. But rather than mourn its losses or even exacerbate its misjudgment by building yet another PC clone, DEC spent the past 20 months searching for and building what it considers a networking solution rather than just another box.

"We believe," says Peter Smith, vice-president of product marketing at DEC, "that this solution gives MIS a way to not only integrate all those stand-alone PCs out there but a way to deal with the issues of data security and standards in the office."

The information for this report on Vaxmate was gathered in a product demonstration presented by DEC to *Computerworld Extra* prior to the machine's formal release.

A PC AT compatible based on Intel Corp.'s 80286 chip, the Vaxmate is bundled with most of the necessities a desktop user could want.

Packed into its compact package are the following:

- A built-in Ethernet (Deconnect) connection.
- Built-in Microsoft Corp. Windows, which enables users to cut and paste data between PC applications and applications running on a VAX.
- A new DEC keyboard incorporating both DEC and IBM PC functions.
- A virtual disk capability, which allows all storage to take place on a Microvax II server and transparently share programs within the network of PCs.
- Three IBM video modes plus two DEC video modes, all software selectable.
- A client services software package that allows a user to run applications under Microsoft's MS-DOS.
- One megabyte of main memory.
- A built-in printer port and serial communications port.

A one-year warranty is included. The machine features a small footprint with a large tiltable screen and a mouse. The Vaxmate is ergonomically designed, including being convection cooled so that fans do not disturb the office.

At \$4,295, the Vaxmate is priced competitively and appears to offer enough options to attract interest. However, DEC, mostly because of Ken Olsen's disdain of the retail marketplace, does not plan to sell its new machine as a commodity item.

The Vaxmate is being promoted, through carefully focused marketing, as the final piece of the networking puzzle for DEC. Having created a wave of attention with its high-end VAX announcements this year, DEC now has turned its attention to a long-term Achilles heel: the low end.



PHOTO COURTESY OF DEC

According to Henry Ancona, group manager of office and information systems, DEC struggled for a year and a half to figure out a strategy to meet what customers wanted from a DEC PC.

What DEC customers — and many others, DEC hopes — are asking for is the ability to integrate desktop PC applications into a seamless, top-to-bottom network.

The strategy is simple, Smith points out: Tie desktop users together using the strength of VMS and networking solutions that not only take advantage of the PC but also hook transparently to both departmental and corporate host systems.

To that end, DEC proposes what it calls "network group solutions," which currently take the form of two offerings built around the Vaxmate.

The first is a software solution called VAX/VMS Services for MS-DOS. This offering is a generic value-added package for a base price of \$650 that provides central data storage and management for PC users in a networked environment. Through VAX/VMS Services, a user can tap into the VMS environment. This package is of particular interest to DEC's OEM community.

The second offering, PC All-In-1, is a packaged hardware and software configuration with a base price of \$81,160 that marries the PC with DEC's All-In-1 integrated office system. The package, which brings DEC's All-In-1 to the desktop via Vaxmate, has been specifically configured for the nontechnical office worker. Once plugged in, an already loaded software package provides uncomplicated English menus and allows novice users to be systems managers, according to Ancona.

Though DEC hopes future customers will buy Vaxmates instead of IBM PCs, the PC All-In-1 system protects a company's investment in the IBM machines.

IBM PCs can hook into PC All-In-1 immediately through a third-party network connection. DEC promises a package by the end of the year that will provide the IBM PC with the new keyboard, software, mouse and networking features of the Vaxmate.

According to Smith, the two systems are just the first of a series of products to be announced in the next six to nine months that will tie desktop users in virtually every computer environment into the network. Future considerations will focus on Unix users and factory floor applications.

DEC users, while upset at the length of time it took the company to address the low end, nonetheless seem pleased with the results.

Peter Duray, project manager in the corporate MIS department at Polaroid Corp., became a beta-test site user of Vaxmates last December. Using Microvax IIs as servers, Duray tied eight Vaxmates into several Polaroid environments, including computer-aided design, office systems, program development and operations support.

"It was disappointing that the system wasn't as mature going into beta test," Duray says, "but now it opens up a whole new way of computing for VAX users. One of the biggest issues with PCs was that there was nothing to back them up in terms of data security and integrity. It's hard to quantify the value of being able to store data centrally at the desktop level. For a DEC customer, nothing can touch it."

Duray says he believes that the Vaxmate strategy opens a myriad of options for him that were previously unavailable. He can tie his numerous IBM PCs into the environment, and through Microsoft's Windows, he can run multiple sessions simultaneously on the Vaxmate. Duray is anxious to see a more flexible configuration of the machine in which he could add a 19-in. monitor as well as a color monitor. "In doing electrical design, color is a must," Duray says.

At Summation, Inc., a DEC OEM in Kirkland, Wash., Dave Seres says he thinks that this link between the MS-DOS and VAX worlds can only bring success to DEC. Seres, vice-president of planning and technology for the automatic test system maker, says the ability

to tie into VAXs at all levels is what his customers look for. "We encountered lots of people with DEC approaches on the factory floor, and we couldn't offer them this solution. Now we can," Seres says, adding, "It's very attractive to OEMs."

Bill Gates, chairman of Microsoft, is naturally pleased that DEC incorporated his company's Windows into Vaxmate. He says DEC's answer is a good one.

"DEC's emphasis on connectivity is smart and really plays to DEC's strengths," Gates says. But he says he believes the machine will not affect sales of IBM PCs. "This is a machine with Ethernet built into it, so unless you are a company that believes in Ethernet, I don't think you'd be that excited about it. It's a fantastic machine for people who work closely with VAX, and that is a lot of people. It gives DEC a great workstation for DEC customers."

For DEC, the Vaxmate represents a hard and painful lesson about the changing nature of the computer business. It is never easy to admit to being wrong, but that is exactly what the company did when it ceased work on the Rainbow in January 1985 and refused its attention on the Vaxmate strategy.

Olsen, who has emerged as the champion of the VAX strategy, was the driving force behind the earlier personal computer effort. That effort was characterized by DEC's inability to understand the emerging PC market and to get a useful product to market within the proper time frame.

"It's not very complex; we didn't know what to do," recalls Jack Smith,

The strategy is simple: Tie desktop users together using the strength of VMS and networking solutions that not only take advantage of IBM's PC but also hook transparently to both departmental and host systems.

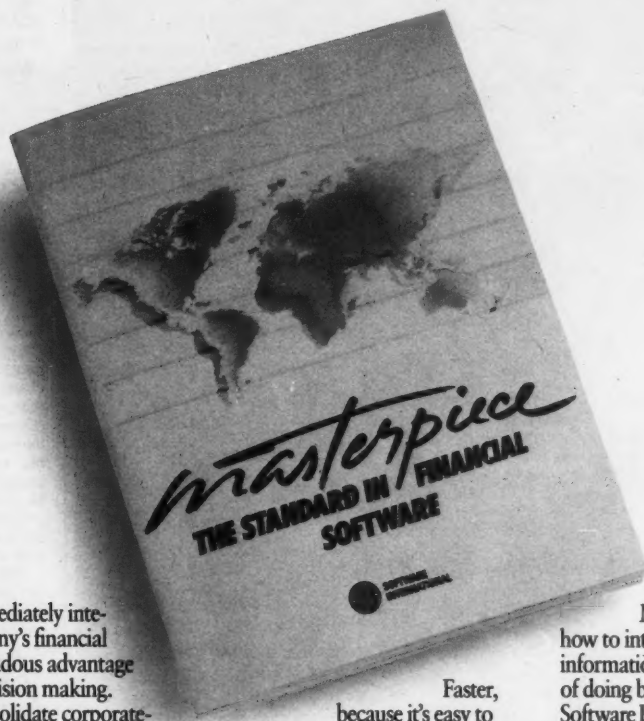
vice-president of engineering and manufacturing. "It wasn't wrong to try three approaches, but we should not have brought them all to market. We confused ourselves, the field and our customer base."

According to Barry Folsom, erstwhile Rainbow product manager and now vice-president and general manager of the East Coast division of Sun Microsystems, Inc., DEC's original strategy in 1981 was to make the Professional its personal computer product. DEC started the Rainbow project as an insurance policy because the cost of doing it was relatively cheap compared with the massive effort behind the Professional. At the same time, the company initiated an upgraded version of the original Decmate word processor.

Folsom recalls the contrast between

■ CONTINUED ON PAGE 12

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NEW PRODUCT REPORT

■ CONTINUED FROM PAGE 10

DEC's and IBM's efforts. IBM let a small group design and build its personal computer without corporate interference. In nine months, farming out virtually the entire machine, IBM put its product out the door. DEC, meanwhile, insisted on building every inch of its PC, including the microprocessor itself. This commitment put DEC a full year behind IBM in the market.

"IBM had the market to themselves for a full year before anyone came out with anything comparable," Folsom says. "They captured the mind-share of the third-party software developers and then a key software application — Lotus Development Corp.'s 1-2-3 — pops out, and the rest is history."

Folsom says he feels that, in fact, DEC was ahead of its time. The Professional, he recounts, connected into

Customers wanted to protect their investment in IBM PCs but also wanted to access DEC's VMS, Decnet and Ethernet environments from the desktop. The idea, while simply stated, was another matter to accomplish.

DEC's PDP networks and incorporated multitasking and bit-mapped graphics. And engineers agreed that the Rainbow, with both CP/M and MS-DOS operating systems, was superior to the IBM PC.

The Professional, too expensive and necessitating too much memory, foundered from the beginning. The Rain-

bow, ironically, fared far better. More than 200,000 were sold, and the Rainbow will be supported in the new Vaxmate environment.

That number of sales was simply not enough, however. Retail channels dropped the Rainbow, a bitter blow to Olsen, and the press raked the company over the coals. The entire fiasco cost

DEC a reported \$500 million.

"Ken wasn't easy to deal with at that point," recalls Gordon Bell, then vice-president of engineering. "He had failed in his engineering project. He was driving that project."

By November 1983, Folsom was pushing for an IBM PC-compatible version of the Rainbow. DEC approved the idea, and the PC25 and PC125 projects got under way. But that development was characterized by months of wrestling with questions about add-on boards and packaging. Jeff Kalb, vice-president of low-end systems, along with Folsom and other DEC managers, began to realize during this period "where things were headed."

"It was obvious that we didn't need another PC clone. We needed higher value added and functionality for approaching the marketplace," Kalb explains.

While some DEC customers clamored for a faster, fancier clone, the decision was made to listen to another set of customers.

This group of customers wanted to protect its investment in IBM PCs but also wanted to access DEC's VMS, Decnet and Ethernet environments from the desktop. The idea, while simply stated, was another matter to accomplish.

Kalb admits that the original time frame for Vaxmate's development was 16 months. It took 22. "That was a challenge from Ken Olsen, and we didn't meet the challenge schedule," he acknowledges. "But we don't feel we took too long to build a product this complex. To the user, we've made it look simple, but the very art of making it simple is hard."

One of the difficulties was getting the IBM PC integrated into the VAX environment. Another was convincing Olsen that the machine should include an AT bus and IBM expansion slots. Olsen, apparently averse to anything that might lead to interest from retail channels, fought the idea of an AT bus integrated into the machine. Without a bus, the Vaxmate would be software compatible but not hardware compatible, which would shut out virtually any peripherals being hooked to the new environment that were not specifically from DEC.

The compromise solution: Put the AT bus and slots in an optional expansion box that sits directly under the Vaxmate on the desktop.

As the machine ships, customers and consultants will undoubtedly be seeking more capabilities. A color monitor is being engineered, but no target date has been announced. "We did a survey that showed 93% of users use monochrome screens," Kalb says.

DEC is also readying its Vaxstar, reportedly a portable Microvax engineering workstation with a built-in Ethernet connection, and the firm must take care not to confuse potential buyers about which machine to consider.

But as Folsom points out, the Vaxmate should do well because "networking is incestuous. Once you get a few people on it, everybody has to be connected. If you can get all the PC ATs attached to it, you'll sell more VAXs. You want the price and marketing to be such that a person considering a new purchase will buy a Vaxmate instead of an AT. But the whole intent is not to sell Vaxmates, it's to sell DEC systems."

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EXTRA



BY GLENN RIFKIN

Machines continue to roll out, tied together by a golden thread of connectivity. Even the least important announcements become major media events. The watchers and critics, so recently scornful, are singing a new, respectful tune. It is, by any measure, the year of DEC.

In Maynard, Mass., DEC President Ken Olsen speaks with humility. Success, he says, scares him as much as failure.

It is in the flush of victory that the greatest mistakes can be made. "We got into all the trouble we were in by having too many years of good times," he insists.

The wounds of three years ago may be healed, but they ache ominously whenever the celebration gets too loud. Olsen knows too well how quickly adulation can turn to finger pointing in this computer business. The scientist and the Christian, he says, must believe in searching for the truth and being humble.

The corporate officers and the troops fall in line, echoing the caution. But there is clearly vindication on the faces of DEC. Nobody openly sneers in the direction of Armonk, where Big Blue shuffles uneasily. But there is a certain giddiness in knowing that a long,

■ CONTINUED ON NEXT PAGE

EXTRA

■ CONTINUED FROM PAGE 15

arduous adherence to a single strategy is finally paying off and also in knowing that despite its size, strength and tenacity, IBM currently doesn't have an answer to a seamless top-to-bottom computing environment.

"We had a vision of computing we knew the world needed," says Olsen, DEC's guiding spirit, about the founding of his company. "We were only planning to sell whatever the world wanted. We never set growth goals."

During the course of nearly 30 years, Olsen's vision has remained steadfast. Despite occasional slips and one major dip three years ago, Olsen has stuck to his corporate dream. The company began to re-emerge in early 1985, climbing toward a height it had never reached before.

Long-delayed VAX machines appeared, along with the first networking scheme that corporate users — tired of vendor promises — could actually implement. While some waited for IBM's Token-Ring solution, DEC solidified its strategy around Ethernet, and its status as a standard grew. The product plan was simple yet ingenious: one architecture tied together across all machines along with connections to IBM that others were merely intending to provide in some vague future.

DEC is hot. Analysts predict that for at least the next 24 months, DEC will be the industry trendsetter. It will take at least that long for any other vendor,

including IBM, to stem the momentum DEC has established over the past two years. The MIS manager in the Fortune 500, not a traditional DEC advocate, is being urged to take a closer look — not only by a new and aggressive DEC marketing scheme but also by independent consultants.

"DEC has a hell of a story to tell MIS," says Marty Gruhn, vice-president of the Sierra Group, a Tempe, Ariz., consulting firm. "DEC has products that will add value to the dollar, and the MIS guy wants that. MIS doesn't have IBM stamped on its forehead. DEC has products where IBM is weak, and customers are using DEC as leverage against IBM."

IBM, for its part, has reportedly decided that the competition has narrowed to just itself and the upstart from Maynard. According to consultant George Colony of Forrester Research, Inc., Stephen Schwartz, president of IBM's System Products Division, stated that DEC is the target. His weapons include the System/36 and 38 and the yet-to-be-announced low-end 4300.

DEC, for its part, keeps peppering IBM with blows aimed at its lack of connectivity, compatibility and networking capabilities. "We hook into an IBM environment better than IBM hooks into an IBM environment," re-

AT A GLANCE

Digital Equipment Corp.

Founders: Ken Olsen, Harlan Anderson, Stan Olsen

Year founded: 1957

Initial Capital: \$70,000

Headquarters: The Mill, Maynard, Mass.

Locations: 600 sales, service and manufacturing sites in 54 countries

Employees: 94,000

Revenue (fiscal 1986): \$7.59 billion

Profit: \$617 million

Fortune 500 ranking: 55

peats more than one DEC executive.

But DEC is not stupid, says Bob Hughes, vice-president of services industry marketing. "The humbling fact is that IBM has 40% of the industry's sales but 70% of the industry's profit. We have yet to learn from them about profitability as we have learned from them in many other ways about how or how not to do certain things. We do not have any designs on overtaking or replacing them."

This self-effacing stance, of course, is both an honest assessment and a smoke screen. DEC did not land in its enviable position by being humble with potential customers. The company indeed has a story to tell and is aggressively telling it. There is a new-found religion at DEC, and it is called marketing.

"DEC realized it couldn't grow by being a provider of iron," Gruhn points out. "So they accurately identified what the users wanted — networking and connectivity — and started to market that. Ken Olsen has found an approach to compete with IBM. He's bet the company, and he's going to win."

What surprises an observer who delves into this whole new DEC is how much and yet how little the internal culture of the company has changed thus far. One would imagine that a \$7 billion corporation with 95,000 employees worldwide would have evolved beyond recognition.

In many ways, that is true. The company has gone through four major eras since the doors opened in 1957, eras defined by technology and personalities.

But as long as Ken Olsen remains at the lead, there is an unbroken thread that ties the past with the present. "It's always a limitation to be consistent with the past, but an overwhelming advantage to be consistent with the past," he says.

Though the company is often termed "dull, stodgy and technical" in the image of its founder, its story rivals any of those told by such media darlings as Apple Computer, Inc. or Lotus Development Corp. In fact, DEC blazed the very trail that the much more heralded microcomputer companies followed two decades later.

The DEC story is ostensibly Ken Olsen's story. He is the almost mythic father figure, the unchallenged leader who has reigned longer, in fact, than any original company president in industrial history.

But Olsen himself constantly credits

the people around him with the success of DEC. He is not a man without faults, and will disarmingly acknowledge those faults in public and private settings.

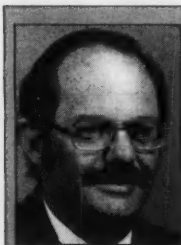
When asked at a recent product announcement why DEC closed its new VAXBI bus structure to third-party developers, Olsen replied that a better question would be, "Why did we open the old bus structures? The answer is, I don't know," he stated. "It certainly was sloppy business, and we won't do that again."

He is a leader who so ingrains his values in his company that employees, while unable to comprehend DEC without him, insist that the culture will not change when he is gone.

In the 1950s, with the transistor revolution just beginning, Olsen and his young colleagues at MIT's Lincoln Labs quickly grasped the idea that the void between the glass-enclosed mainframe room and the engineer or scientist must be bridged. Though the term end user was decades away, the idea was crystallizing in Olsen's mind.

That image produced the same heady feeling that a later generation would experience with the advent of the microchip. Computers were getting smaller, easier and cheaper to build, and people wanted to touch them and use them.

Working on the SAGE Air Defense Computer System, an on-line interactive system, along with engineers like Harlan Anderson, Dick Best, Ben Gurley and Stan Olsen (Ken's brother), Olsen got a taste of interactive computing. The inquisitive engineering minds at MIT wanted to get their hands on these



We knew very clearly what we were doing, but we didn't know exactly how to do it.

— Stan Olsen

machines, input data, get results. Olsen and his colleagues saw the prospects: computing the world wanted and needed. MIT could provide the brainpower, but a new business would be required to make it fly.

A grandiose plan for a business was hatched by a group of engineers. Too many people, too little vision of how to make it fly grounded the effort. Olsen would have been chief engineer, Anderson a member of the engineering team. When the effort collapsed, Anderson approached Olsen, his former boss at Lincoln Labs, and suggested the two of them start a company — smaller, more modest and easier to get off the ground.

The pair spent lunch hours at Lexington Library studying Standard & Poor's financial data to discover what successful companies did right. Two engineers starting a business felt like dancing with two left feet.

"We had no accounting background at all," Anderson recalls. "So we got a copy of Paul Samuelson's economics textbook, with a primer in the appendix on how to do accounting for Apex Toothpaste, Inc. We studied that backwards and forwards until we could have started a toothpaste company."

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EXTRA



KENNETH HARRY OLSEN

Born February 20, 1926. Prepared at Stratford High School. Entered Freshman Year. VI-Electrical Engineering. Dean's List 4. American Institute of Electrical Engineers (3). Vice Chairman (4). Boat Club (1). Hobby Shop (3, 4). Interservice Christian Fellowship (1, 2). President (3, 4). Television Society (3). Field Day Football (2).

(MIT CLASS OF '50)

Ken Olsen: Life before DEC

The press and financial and industry analysts are no longer suggesting retirement. DEC's employees have stopped wondering if he has lost control of the company. Now he is compared with Henry Ford and called one of the greatest industrialists of the 20th century.

For Ken Olsen, praise is much the same as scorn. He listens, weighs the value of the remark and then heads back to work. In an era of slick, buttoned-down, Brooks Brothers-type chief executive officers, he is a large, somewhat rumpled breath of fresh air, saying what he believes as his public relations aides cringe to the side.

Born in 1926 in Stratford, Conn., Olsen was the second oldest of four children growing up in a tightly knit, religious atmosphere, while the family struggled through the Depression. There was no money, but Olsen's father, a machine tool designer, had a wealth of tools in the basement where Ken and his younger brother, Stan, tinkered with radio kits and any other electronic gadgets they could find.

After high school, Olsen joined the Navy and fought in World War II. When he left the Navy, where his interest in electronics was piqued, he was determined to gain entrance into MIT. He not only was accepted, but he tore through the curriculum in three years.

At MIT, Olsen discovered a passion and ability for computers. He and Dick Best, DEC's current chief engineer, helped design the Whirlwind, a breakthrough machine on which later undergraduates, such as Gordon Bell, learned programming. Bell would go on to engineer several of DEC's key computer architectures. Olsen stayed on after graduation to work at the university's Lincoln Labs. He earned the reputation as a stellar engineer while working on the SAGE air defense computer system. It was at Lincoln Labs that the seeds of DEC were sown.

— Glenn Rifkin

The venture capital group, American Research and Development, would have been just as happy had the pair started a toothpaste company. What the group insisted on when investing the initial \$70,000 was that the start-up avoid making computers. Both RCA Corp. and General Electric Co. were experiencing such severe problems with their computer divisions that there seemed to be no future in selling the machines.

In their newly rented space in the old wool mill in Maynard, Olsen, Anderson and Stan Olsen, who joined the pair on day one, acquiesced to the investors' wishes and started producing printed-circuit logic modules instead of computers. By the end of the first year, using equipment ordered from the Sears & Roebuck catalog and the services of a local portrait photographer for develop-

ing film of printed-circuit boards, the start-up somehow made a profit.

What was clear from the beginning, according to Anderson and Stan Olsen, was that Ken was the leader. Quiet yet strong willed, he took control of the engineering while Anderson handled the finances and accounting. What was also clear was the mission: to bring computing to the people. "We knew very clearly what we were doing," says Stan Olsen. "But we didn't know exactly how to do it."

Though the influence from MIT was strong, Ken Olsen never intended DEC to mirror his alma mater. His whole world up to then had been engineering, so he started hiring engineers.

The 12th employee, Jack Smith, now

senior vice-president of engineering and manufacturing, joined in 1958. He remembers an atmosphere of freedom and creativity. In a roomful of engineers, there was little expertise in areas such as manufacturing and sales.

"What I liked about the environment is when any situation came up, if you as an individual felt you could contribute to that, you were allowed to do it," Smith recounts. "Of course, we made a lot of mistakes, but there was a sense of freedom."

"One thing that hasn't changed," adds Winston Hindle, senior vice-president of corporate operations, "is the who proposes does."

Despite the fears of its financial backer, DEC couldn't be kept out of the computer business for long. Ben Gurley,

■ CONTINUED ON NEXT PAGE

RAF'S ETHERNET SOFTWARE HAS JUST SMASHED ALL RECORDS FOR PC TO VAX INTEGRATION.

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Unlike other products which force PC users to become network gurus, RAF allows PC users to remain PC users. RAF acts as an extension to a PC, allowing users to directly access files stored on remote systems as quickly and easily as files stored on local floppy or hard disks. Users can, for example, use PC editors to edit VAX files or use PC spreadsheet programs to manipulate information stored on the VAX.

And MS-DOS commands can manipulate remote files exactly as they normally access local files. Cumbersome file transfer programs are no longer needed—a simple COPY command will do.

ETHERNET MADE EASY

RAF communicates via a LAT compati-

ble protocol allowing PC users to directly access remote systems as if connected through a terminal server. No special hardware is required on the VAX because RAF users appear as normal terminal connections to the host.

RAF also allows users to maintain multiple system connections simultaneously with the freedom to instantly switch from one connection to another. And RAF preserves each connection's screen, making the control of multiple simultaneous connections much easier.

UNSURPASSED TERMINAL EMULATION

RAF's VT100 terminal emulator is always there when needed. From the middle of a PC program such as Lotus 1-2-3, a single key-stroke will instantly transform a PC into a VT100 compatible terminal allowing fast direct access with a remote

computer. And the same keys will return the user to Lotus exactly as it was. Soon RAF will support VT220 emulation as well.

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the company's first computer engineer, designed a breadboard for a "Program Data Processor" in 1959, and in 1960, the PDP-1 was unveiled. The PDP designation was a direct attempt to de-emphasize the fact that these new machines were actually general-purpose computers.

Anderson recalls that DEC gave one of the first machines to MIT's electrical engineering department. The gift was received with a smirk. It was turned over to the students to use as they wished outside the school's main computer center.

The students jumped at the opportunity for not only an interactive machine but cheap computer time as well. Several students, impressed by the new machine, came to work for DEC upon graduation.

One of these students, Gordon Bell, joined as the second computer engineer in 1960. He had been a co-op student at GE and disdained the large-scale engineering environment, in which hundreds of engineers work on one project. At DEC, people could take charge of projects, taking as much or as little responsibility as they wanted. Delegation of responsibility is still a tenet of Olsen's leadership.

In the 1960s, the responsibilities began to grow. DEC became known as an engineer's paradise and attracted the best and the brightest. The PDP-1 was sold in large numbers to ITT for message switching, and that fortuitous sale made the product a standard.

The seeds for a new and unexplored business area, the OEM market, were sown with the 1963 advent of the 18-bit PDP-4, a machine designed in conjunction with Foxboro Corp. as a real-time process controller.

A revolution was brewing in the computer business, and DEC was as likely a place for it to begin as any. Led by the engineering talents of Bell and Edson de Castro, now president of Data General Corp., the PDP-5 and later the PDP-8 emerged.

The PDP-5 was designed to do process monitoring for the Atomic Energy Commission of Canada's reactor at Chalk River near Ottawa. It was what Bell called "a minimal computer" because of its low cost — \$27,000.

Some credit the PDP-5, a 12-bit machine based on MIT's series of LINC computers, as the world's first minicomputer, but Bell believes that honor must go to the follow-on PDP-8.

In 1965 at a meeting in Olsen's cabin in the New Hampshire woods (all off-site DEC meetings have since come to be known as Woods meetings), members of DEC's operations committee decided to aggressively price the PDP-8 at \$18,000, with the hope that this unheard-of price tag would generate great sales volumes.

"It was a turning point," Hindle says. "It put us into markets we'd never been in before and marked the beginning of the minicomputer business."

The new machine, Bell recalls, was far faster and smaller than its predecessor and cost half its nearest competitor. The minicomputer revolution was under way. Literally hundreds of start-ups hurried to enter the business and most got out just as soon. "Most of them didn't understand that you need more than just the knowledge of how to make a computer," Olsen recalls. "You

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Ken Olsen on...

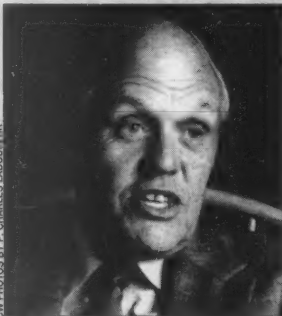
The history of DEC:

In the area we concentrate on, we have more expansion possibilities than we can exploit, and going into other things would neutralize or pollute it. So an important part of our strategy is to have simple goals and then put enormous resources into them.

With networking, which is all-encompassing, it was very clear that we had to be one company. And with that, most of the entrepreneurs quit.

Good entrepreneurs can't delegate anything, except maybe the budget, and they can't hire anybody to run the thing. When I said, "We're going to be one company and all work together," that was the ultimate blow to their spirit. Entrepreneurs don't work together. That's their nature.

So there was the disappointment of losing all my friends, all of whom I



asked not to leave — if I were smarter, I would have encouraged it earlier. They left; they were sure I was a dictator, ruining all the good things. But we obviously couldn't survive with the 15 companies in this new world. This new group of people, who had been there all along, turned out to do very well.

The nature of the computer business has changed. You used to have a lot of people who could make computers. Those who worked hard and moved faster could make them faster, just like there used to be many automobile dealers. Little by little, they've all disappeared.

When you are making an enormous investment in R&D and an enormous investment in capital, it's very easy to make computers. So that means the world is not going to need very many computer companies. Hundreds of outfits used to make airplanes. There are very few left. That's going to happen in the computer industry.

One of the reasons for the computer recession is that they sold too many machines, too many PCs. People didn't want them, didn't need them, didn't know how to use them.

Weathering the bad times:

It's kind of nice to not have people say I'm too old. But I don't feel any need for vindication, because it's very understandable how people get caught in the trap of that kind of thinking. The young reporters had no experience with computers, except with personal computers, and they did such wonderful things, and they promised to be faster and have bigger memory.

And I could not explain to them that that's not what you need to run a whole business. If I couldn't explain it to them, I can't really blame them for not grasping that.

And then when we lost all the vice-presidents and they said I was ruining the company because they didn't want to work together, I could understand the press reaction. So I don't need vindication.

Management philosophy:

One immoral thing to do is to overpay somebody. If you overpay him, you ruin his life. He has to keep bluffing, struggling to keep that pay or take a cut, which some people can never tolerate. It's absolutely immoral to overpay somebody.

If you strive for honesty, it does make a major difference in how you operate. Obviously it's not easy, because you can go too far one way or the other.

In the business we're in, humility and searching for the truth are very important. If someone says, "I invented a new network, it is the only one... it's exactly what you need," you can almost be assured he is wrong.

Enjoying success:

The final picture of success is how well the company does after you're gone, then how long after that.

It's so exciting now, so nice to see the products going out and being sold. It's much more fun now. In that era when product lines had reached past their useful time, we didn't have the discipline in engineering; we were not getting the products out when we should. Now we turn out products so fast, we've got to slow them down.

I enjoy talking with people. But in theory, I'd like not to because we should start pushing others ahead. But we have a message to get across.

We are asking people to commit their whole company to us. Little companies can go to Computerland and tie a network of small PCs together. We're asking people to tie a whole company together.

Corporate strategy:

The VAX architecture is a growing, evolving thing, so the main constraint is that it plays VMS. It's a disciplined architecture. There's a certain amount of freedom without giving up the enormous assets of VMS. The architecture may not be exactly the same, but it will still be a VAX. Our plans are always to be VMS-based. It will always play VMS.

You always think you can make a more efficient machine by starting over. There have always been people who can make specialized machines faster and cheaper, but we always had this big customer base that we have to continue to satisfy.

Token ring probably has a long way to go before it's finally defined. They don't build large ones, useful-size ones yet. And so we have little interest in

token ring until it's a useful product.

We don't have the equivalent bridge to some of the other manufacturers' computers, which we'd like to have, because they are sloppy in their standards, and we just can't make bridges.

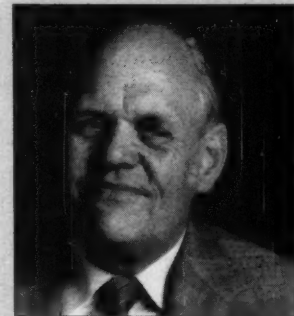
We do well in most companies selling networking into pieces of

the organization, but it takes a long time to convince people that they have to plan to do the same things for the whole organization.

MIS departments:

Most people are dependent on their MIS groups, and the MIS groups are dependent on IBM. We tell our friends that's a mistake because MIS is not the group that knows most about how a company runs. There is a new generation of MIS coming along that has a broad view. The MIS director normally has only one high priority, that's for payroll. The MIS director does not know anything about manufacturing or laboratories or engineering or the office. The chief information officer high in the organization has to be responsible for setting standards for everyone so they communicate, so that this modern world of communications, sharing information, will revolutionize business.

We're not asking them to understand DEC. First we're asking, "Do you understand the corporation and



what the needs are?" And then you introduce standards for communications because they all have to speak together. So our pitch is not to sell DEC directly.

This is the message we have to American business: If you allow everyone in your organization to run off in a different direction, you are never going to communicate and never accomplish what you can with modern computing. But if you get going in the same direction that allows creativity and productivity... We preach that message and say, "It sure did help us."

EXTRA

■ CONTINUED FROM PAGE 18
need software, sales and service as well."

Despite the growing multitudes in the business, DEC clearly emerged as the leader. And it became a takeover target. Olsen recalls being approached by companies such as Harris Corp., Singer Co., Xerox Corp. and Hewlett-Packard Co. during that period. "HP wanted to buy us and said, 'We'll compete with you if we don't,'" Olsen says. "So they competed with us."

Even with the PDP-8, new markets sometimes resisted penetration. Stan Olsen remembers a visit he and Ken made in 1965 to *The Wall Street Journal*. "Ken and I tried to lay out what the possibilities might be in the future in typesetting," Olsen says. "They told us, 'You will never get an editor to sit in front of a tube.'"

Undaunted, DEC pushed hard into markets it did understand. The scientific and technical community welcomed DEC's carefully engineered machines and the understanding its sales and service people showed for their needs. PDP-8s sold furiously through a combination of OEMs, a concept DEC is credited with originating, and direct sales.

Internally, the company was experiencing its first period of upheaval. Ken Olsen was forced to recognize that the loose start-up atmosphere was creating glitches and that a new, structured management style was needed. "We were busy building the organization and growing, so we had our heads down during that period of time," notes Jack Shields, senior vice-president of sales and service. "My job title didn't change even though my job responsibilities were doubling every year."

In what Bell terms "a brilliant piece of organizational restructuring," Olsen implemented the product line structure in 1966. The company was organized according to product lines, each group having responsibility for its own bottom line. Unlike other division-oriented companies, like HP, the product line groups shared major functions, such as sales, manufacturing and R&D, on a corporate level.

This matrix style of management served two purposes. It spearheaded tremendous growth for DEC over the next 15 years, and it established a corporate culture. That culture would be both praised and attacked as time went on.

Olsen's notion of management was simple: Hire talented and motivated people and then let them do their thing within a disciplined environment. All decisions would be made by committee; there would be no dictates handed down from on high.

The management formula, widely praised (in Thomas J. Peters and Robert H. Waterman Jr.'s *In Search of Excellence*, for example), served DEC well for the next decade before it began to show signs of wear.

In 1966, however, other troubles surfaced despite the euphoria of growth and profit. Harlan Anderson, one of the company's founders, decided to leave. Though neither he nor Olsen will comment on the reasons for the departure, it seems clear that Anderson was squeezed out because he could not negotiate a role with Olsen. DEC went public in 1966, and Anderson took his windfall and embarked on a career as a

venture capitalist.

Gordon Bell, burned out at age 32 after engineering three machines in six years, left Maynard to teach at what was then Carnegie Tech in Pittsburgh. "At one level, I was tired of engineering," Bell recalls. "I also had a pretty good view of what was going to happen for the next few years. DEC was a \$20 million company at that point, and there were too damn many products for a \$20 million company. I built computers, and the last thing DEC needed then was more products."

Bell took a leave of absence as a consultant and remained remarkably active for someone supposedly off duty. He helped solve engineering problems on both the PDP-10 and PDP-11 while at Carnegie.

By 1968, a great dark cloud was building over DEC. A small group of

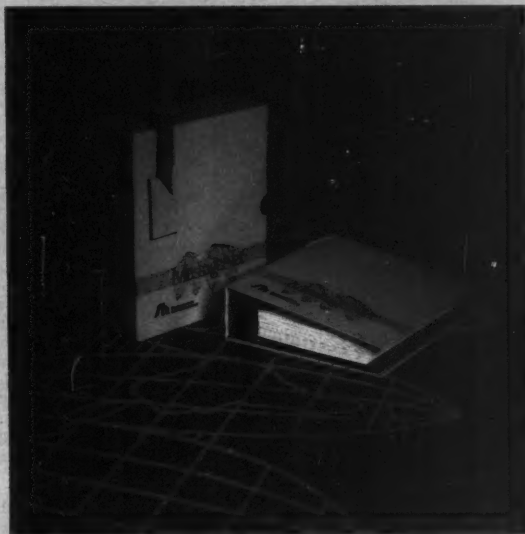
engineers, lead by de Castro, the designer of the PDP-5 and PDP-8, left to form Data General Corp. in Westboro, Mass. The story has since been told and retold to no one's satisfaction; the truth is elusive.

After the PDP-8, de Castro went to work on a new 16-bit machine that some, such as Bell, believed would have been even better for DEC than the highly successful PDP-11. The PDP-X project was reportedly killed by DEC, and an angry de Castro left to start



Gordon Bell, architect of VAX strategy

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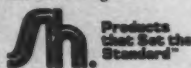
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EXTRA

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DG. Olsen accused de Castro of spending nearly two years on DEC's time designing a machine to launch DG.

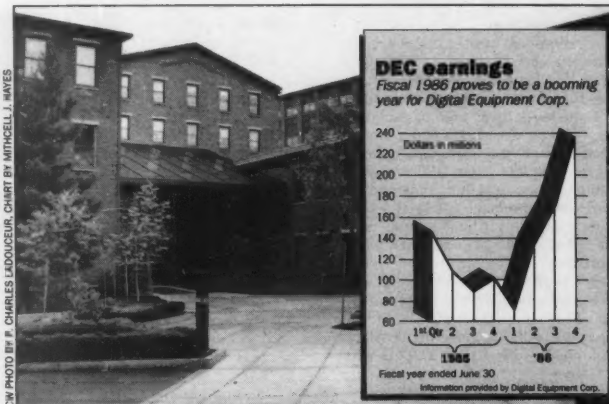
De Castro won't comment on the incident anymore but Olsen, though also reticent, still becomes animated when discussing it. "We have a copy of their log for two years before [DG] was started, so we know exactly what went on in that period of time," he declares.

"But we've never exposed it, and we never sued them. We did not turn down a machine that they proposed completely, and the part of the story that we refused to build a machine and they went off to build it somewhere else is blatantly not true.

"It's nearly 20 years since then, and it's better to be friends and forget it; 20 years is too long to hold a hurt," he adds.

Those who know Olsen claim it is a hurt he still holds. He reportedly places great trust in his employees and expects loyalty in return. It was this same feeling of betrayal that DEC experienced in 1983 when a cadre of vice-presidents jumped ship during its latest period of gloom.

Clearly speaking on a subject he disdains, Olsen reflects on the DG incident by saying that the worst mistake DEC has made was ignoring DG, and "the wisest thing we ever did was not sue them. It would have torn us apart. Things were pretty bad. Anger tears your heart out. We make computers instead."



Those who were insiders at the time believe that Olsen and de Castro simply couldn't communicate with each other. Outsiders, such as noted DEC-watcher Sonny Monosson, editor of "Monosson On Dec," say it was the complexity and politics of the matrix management structure that exacerbated the problem.

"To get anything done in the company, you had to buy or confirm the loyalty of manufacturing, engineering, distribution and everything else," Monosson explains. "It was very difficult. There were times in those early days that Ken Olsen himself said he didn't think he could have had things done that he wanted unless he got the rest of this group to agree."

With superior products, layers of

qualified people in place throughout the company and Olsen's steady hand, DEC more than survived the crisis. The 1970s were characterized at DEC by high growth, increased competition from DG, HP, Wang Laboratories, Inc. and an apparent lack of interest from IBM, which had chosen to basically ignore DEC's notion of computing.

The PDP-11, the company's versatile 16-bit offering, carried DEC through a good portion of the decade in its booming OEM business, while the Decsystem-10, which gave birth to the time-sharing concept, produced significant revenue in the 36-bit market.

Bell returned to take on the role of vice-president of engineering in 1972. The promise of very large-scale integration technology excited him, and he set out to build what he terms "one of the best engineering groups in the world."

John Sims, now vice-president of personnel, joined the company in 1974 as its equal employment opportunity administrator. "There was an air of openness, honest competitiveness and anxiousness to do what was right," Sims remembers of the mid-1970s. "I was struck by the ability of people at all levels to be open and avoid politics that go on in most offices."

DEC employees also learned during that time about Olsen's attitude toward success. It is, many affirm, the time when he was most ardent in self-examination — challenging, probing, asking questions about the company. It comes, Bell says, from a massive determination to do what's right.

During the mid-1970s, Bell and his engineering colleagues realized that the company's computer architectures needed serious attention. The competition was reportedly ahead in 32-bit architectures and the minicomputer market had turned into a seesaw battle of MIPS and price/performance.

In 1974, DEC centralized its engineering group to tackle an obvious problem on the horizon: The PDP-11 was simply not big enough; it was running out of address space.

Bell drew up plans to extend the address on the PDP-11 and dubbed it Virtual Address Extension, or VAX. DEC's operations committee, as it had done before, began three simultaneous attempts to solve the power problem. From these three factions, the winner would emerge.

Bernie Lacroute, now executive vice-president of Sun Microsystems, Inc., was group product manager of the VAX team. He and Bell championed VAX against the two other alternatives — to

extend the PDP-11 and to extend the Decsystem-10. Olsen, who today garners credit for the company's VAX strategy, actually had little to do with its development.

In fact, Bell was relieved that Olsen kept his distance. As such a powerful figure in the company, his suggestions were occasionally mistaken for dictates, wreaking havoc in the development process. "As he got closer to the project, he scared the hell out of me," Bell recalls.

It was clear to the operations committee that the PDP-11's 16-bit architecture would not extend very far and that the 36-bit architecture was a 10-year-old technology and thus not appealing. "The important factor at DEC has always been 'What is the lifetime of the scheme?'" Lacroute says. "DEC has always been good at defining architectures that last more than a year or two."

DEC approved a move that may one day be viewed as the most crucial in company history: DEC went with the VAX architecture.

Lacroute's team was ecstatic. In *The Soul of a New Machine* fashion, they set out to create, Lacroute says, "the best damn computer architecture that had ever been put together." The challenge lay in preserving compatibility for DEC customers and creating a simple, elegant design.

The group became DEC's elite corps of engineers during development. "The mission was clear, the target was clear, so you didn't have to worry about any company politics," Lacroute says.

The VAX-11/780 was introduced in 1977 and became an immediate industry standard against which other mini-makers rated their products. It reaffirmed DEC's position as king of the minicomputer industry.

Gordon Bell, meanwhile was putting together a whole new notion of computing that would form the foundation for DEC's current company strategy.

Before the commercial wave of personal computers struck, Bell conceived of a three-level model of computing with the central or mainframe machine on top, minis as distributed machines and micros on the desktop. He also foresaw the need for a single architecture across those levels.

The VAX strategy was put on paper and approved by the operation committee in December 1978. It positioned VAX at the heart of an integrated strategy and called for the curtailing of all other development.

The strategy was not welcomed by all. Bell recalls the initial reaction: "Are you crazy? You're killing all these machines." He countered with a proposal that would continue chip development on the PDP-11 and Decsystem-10, though the company's main focus would be on VAX.

Olsen was not enthusiastic in support of the strategy but took his cue from the operations committee. "I took no active part in forming the strategy, but once it got going, it was my job to say, 'We're one company, this is the strategy. If you don't like it, get out,'" he says.

As DEC entered the 1980s, it had firmly established itself as the No. 2 computer maker behind IBM (though so far behind as to be in another league). In 1981, Stan Olsen departed to pursue real estate interests, leaving Ken as the sole original founder. Stan, as did others in the DEC community, thought that all was well and secure. Trouble, however, was heading toward Maynard from sev-

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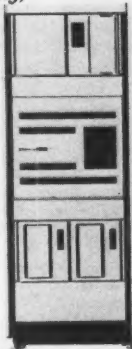
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eral directions, and it all hit at about the same time.

The product line management style had run its course and for several years had outlived its usefulness. The result was a bloated, top-heavy mass of bureaucracies fighting among themselves for attention and funding.

"The real indication of the problem was the customer frustration," says Peter Smith, group vice-president. "Each of the groups was staying close to its customers, but customers who had to deal with several of these groups were being driven crazy."

It was no easier for the sales people who, Smith says, had to make 18 phone calls to the home office to find out the current strategy.

Meanwhile, the major product lines were nearing the end of their life cycles, and follow-on products for the VAX and Decsystem-10 hit major snags simultaneously. Bell remembers attending a project review for the Venus (VAX 8600) on a Friday the 13th in 1980. "I saw that the project was all screwed up, and I stopped it at that point," he declares. "I had to bring in a whole new management structure."

Bell also discovered what he calls "a simple case of incompetence" in the

They were writing our obituary, and we thought, 'Has everyone gone bonkers?'

— Jack Smith

group working on the Decsystem-10 follow-on. Olsen remembers the situation similarly.

"Logic says we should have stopped the Decsystem-10 earlier because we were making two investments in machines that were the same size going to the same area," he explains. "We told our customers that IBM drops many machines, and they said, 'Yes, but we never thought you'd do it to us.'"

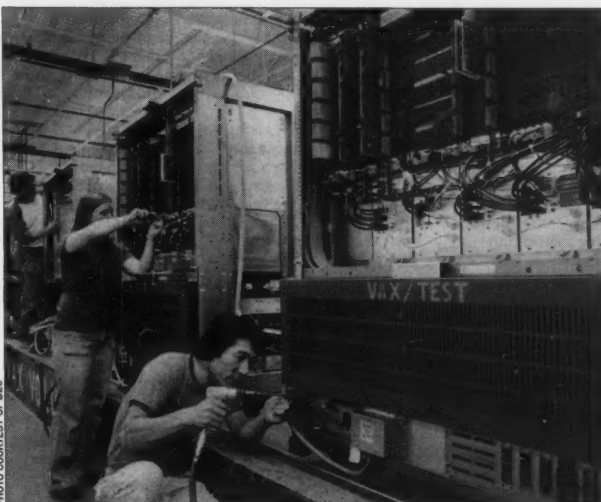
Olsen points out that while the VAX 8600 team revamped its work and started essentially from scratch, the Decsystem-10 team tried to take shortcuts and avoid doing any simulation work on its Jupiter project. The machine was then killed.

"They wanted to do another one," Bell recounts, "and I said no. I saw the same cast of characters and no structure. You don't start projects with incompetent people." The point was moot anyway, because DEC had already committed to the VAX strategy. Like it or not, Decsystem-10 customers would have to switch over or seek another vendor.

Decsystem-10 users didn't like it at all. "It was awful," Jack Smith says. "We had a total customer base in one area really pissed off at us." Despite the pain, Smith believes it was the correct decision. "We knew in our hearts that it was the only way to go," he insists.

To make matters worse, DEC's ill-fated foray into personal computers (see story p. 10) was a marketing and financial disaster, costing the company a reported \$500 million.

Realizing that the product line structure had to be removed, DEC set about revamping its entire organization. A group of vice-presidents, disgruntled by



Building the VAX 8000 series, DEC's flagship computer for the 1980s.

the new organization and enticed by the free-flowing venture capital money of that time, left DEC amid rumors of chaos in Maynard.

In late 1983, a bad quarter that was unanticipated by internal accounting led to a loss of confidence on Wall Street — the stock plunged 20 points in a single day — and customers were shaken.

It was a dismal episode for DEC and Olsen. The press and industry analysts questioned his health and ability to run the company. The VAX 8600 was way overdue and DEC had yet to supply a low-end answer to its customers.

One consultant insists that DEC came within two weeks of being acquired by AT&T in late 1984 for \$5 billion. The deal was squelched, he says, only when Olsen refused to give up his management team. Jack Smith denies this, calling it a rumor.

The company was shaken, but Olsen refused to listen to the doubters. He knew that the basic strategy was sound and that when the technology was finally right, the customers would line up for products. He was sad to see the entrepreneurs leave DEC but discovered "to my great satisfaction, underneath them were just tremendous numbers of excellent people who wanted to work together."

Smith remembers that things never seemed as bad internally as they appeared outside. "They were writing our obituary, and we thought, 'Has everyone gone bonkers?'"

Always known as a technology-driven company, DEC had its key engineers locked in with a strong stock-option plan in 1980, a plan devised by Bell to keep his crew from following the lure of start-ups. "If they left, they would be walking away from \$1 million," he says today.

Ironically, Bell himself left DEC in 1983 amid rumors that he and Olsen had clashed.

The truth, Bell says, is that he had done everything at DEC that he had been asked and more. "I basically like to be needed," he says. "We had a great team of engineers, and I thought it was time to go off and do something else." Elemental to Bell's decision was a massive heart attack he suffered in 1982. "I thought I was impervious to the pressure and stress at DEC, but my body told me that apparently wasn't true."

The last major piece of that puzzle, the Vaxmate personal computer, was unveiled on Sept. 4 and answered the nagging low-end question (see story p. 10).

As if they had just discovered DEC again, the media and consulting community jumped on the bandwagon, and by the middle of 1986, the company was proclaimed not only fit but fabulous. In a slumping computer industry, DEC registered a 38% increase in earnings for the year.

The numbers are likely to remain high. Paine Webber, Inc.'s Stephen K. Smith recently raised his earnings per share estimate from \$6.50 to \$6.75 for fiscal year 1987 and added that "considerable upside remains, both in terms of further margin improvement and in terms of top-line growth."

Olsen, yesterday's villain, is the current industry's darling. But like a clever veteran ballplayer, he knows better than to get too high or too low. "The best things you learn are during tough times," he declares. "I'm asked if I'm vindicated. I'm not vindicated at all. The question is, Can I pull us through a few years of good times without running into the same old trouble? That's humbling."

DEC silenced the critics who said it lacking marketing savvy with a focused, aggressive campaign and the highly successful Decworld exhibition in Boston earlier this year. The company is not letting up on product development and wants to embellish its already significant networking offerings.

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Bob Hughes is administering a new industry marketing push aimed at specific vertical markets in which DEC has traditionally been weak. The company, he says, seeks to double market share, though he won't set a time frame.

In order to double its share, DEC must take accounts away from IBM. For most of its history, DEC has simply been able to sidestep IBM. "DEC's ability to become the industry leader

is as much a function of IBM's inability to react as it is DEC's own success," cautions Sierra Group's Gruhn. "Next year is going to get very nasty when IBM starts to try to close DEC out in small and mid-size accounts. It's one thing to turbo past your competitors when no one is looking. It's not so easy when everything you do is a major event. The challenge is to sustain that momentum."

Even in a down year, IBM managed to walk away with a

\$400 million office automation contract from Ford Motor Corp. that DEC desperately wanted.

"We're asking companies to change the way they operate," Olsen admits. "That's radical thinking and that's hard. But we've got time. We're patient." He points out that that is exactly what DEC itself had to do just recently, so he knows how tough it is to

recognize the need to change.

There is also the concern that the VAX strategy, while sound, is based on a 12-year-old technology. "They're going to have to go further," Monosson states. "VAX is an old architecture now, and they have to keep moving. The nature of the computer business is change."

DEC believes it is up to that challenge. It is spending nearly \$1 billion on R&D, and Jack Smith insists that the company

has major research projects started in every possible facet of future technology (see story p. 57).

Finally, critics question the ability of the DEC sales force to take on the slick and aggressive group from IBM. Colony notes that DEC's sales representatives tend to be engineering-minded and not polished enough to compete with IBM.

Gruhn adds that turning an iron-based sales force into a market-based one is a tough challenge. "Training salespeople and making them effective in front of customers are two different things," she says.

Hughes, a former IBMer, is well aware of the magnitude of the task. DEC has been actively recruiting new salesmen and retraining its existing ones this year. "I've worked in a company that was regarded as a good marketing company, and I've worked in one regarded as an engineering company, and I'd much rather work here," he says. "I'd much rather have good products than good promotion. It's exciting as hell to go into banks and be known as a good engineering company."

Colony points out that DEC now suffers the inherent problems of all big companies: People may feel they don't matter, things move too slowly and there are far too many meetings. Some people, he says, are suffocated by the one-architecture strategy. Even Olsen acknowledges that the old entrepreneurial spirit among the engineering groups has changed significantly. "The Soul of a New Machine days are over," he says. "But there is great freedom in a disciplined approach."

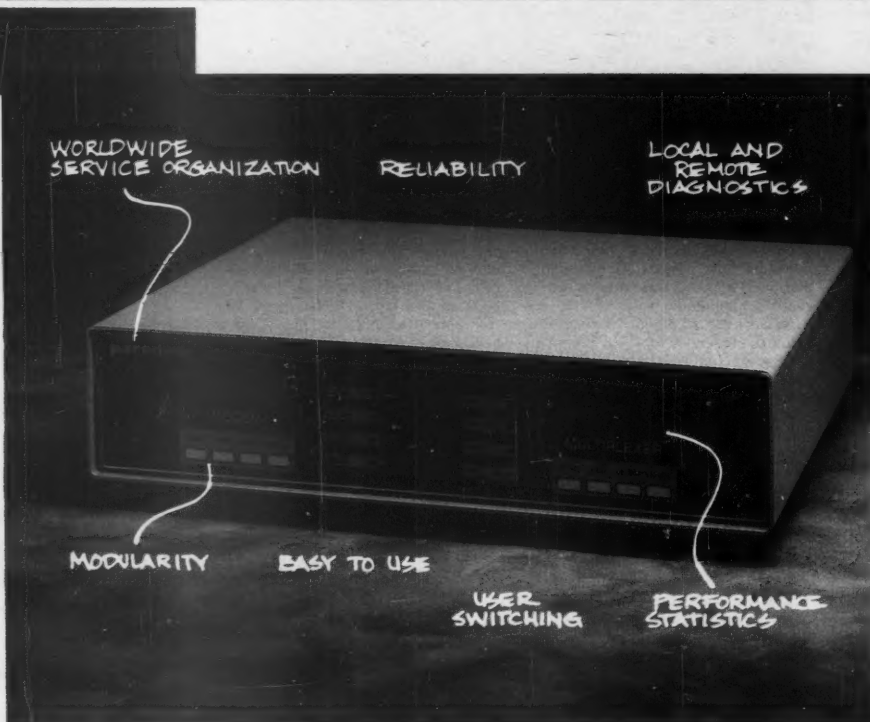
Others both inside and outside of DEC believe that the company remains an excellent place to work. "I know a lot of DEC people, both high and low in the organization, and I've never met anybody who doesn't have good things to say. They are loyal when they are there and loyal when they leave," Gruhn says.

"I feel like DEC's my company," says John Sims, "not because Ken and DEC demand my loyalty, but because I found a place where I can make a commitment and be valued for it."

Such enthusiasm calls to mind another respected workplace — IBM. And like IBM, DEC faces a challenge that the sine waves of the computer industry throw down. In such a cyclical technological and business environment, the top can be an uncertain perch.

Like IBM, DEC carries the pleasure as well as the burden of a huge installed base. Gathering that base is a feat deserving praise; keeping it satisfied and loyal for the decade to come is the larger task at hand.

"DEC knows what it is facing," says Gruhn. "They have to keep the organization tight and well focused. They know they could lose what they have gained very quickly."



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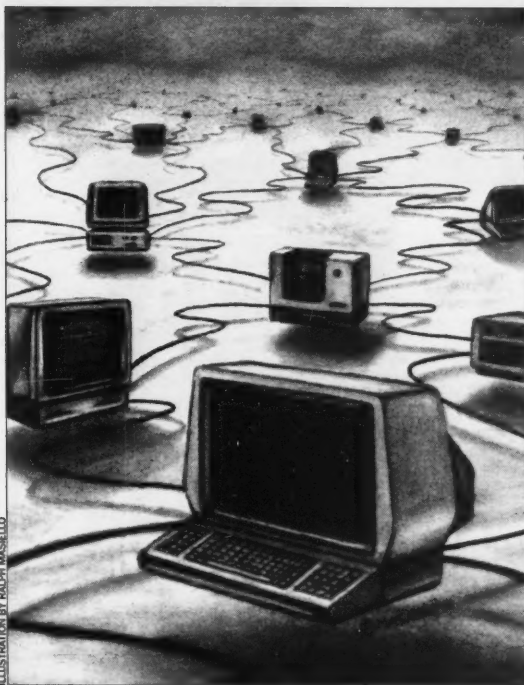
DEC's success and strategic direction are based on two critical factors: the strength of Decnet and the strength and depth of the VAX architecture. Together, these two components currently let DEC address the problem of transparent and compatible distributed computing better than any vendor in the industry.

With the number of devices that DEC can dangle off its network, the company is fulfilling its vision of the network as computer.

Furthermore, DEC is reaching a point at which, as some of its executives are fond of saying, "The MIPS are free" — not literally, of course, but almost. DEC can throw cost-effective VAX computational power at just about any problem it may encounter, from desktop engineering workstations to more demanding, glass-house-style applications.

DEC envisions a consistent architecture spanning corporate needs

THE NETWORK AS COMPUTER



from desktops to large mainframe situations. In delivered and forthcoming products, this strategy translates into a Microvax-type device on every desk or at the head of every work group network up into larger VAXs.

In other words, DEC's strategy is to offer a professionally managed, distributed, VAX-based end-user computing environment.

On the low end of the engineering side of the house, DEC will push the Vaxstation family and its newly announced Vaxmate personal computer strategy (see story p. 10). In the nontechnical office, DEC will offer PC All-In-1 and the Microvax and Decnet as a way to tie together all those pesky personal computers that drive systems managers crazy.

The possibilities here are enticing: Work groups of small multiuser VAXs or networked PCs with VAXs as servers tied into larger VAXs, with a powerful Vax-cluster humming away at the computational hubs within the organization. It is one architecture for all aspects

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EXTRA

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of information processing needs.

This is Ken Olsen's revenge: To succeed against his nemesis, IBM, with a consistent, compatible networked architecture. After years of work, DEC has the broad architecture and the network to tie it together — now.

IBM, on the other hand, has many things now, not all of which tie together smoothly. Although IBM (a company that, ironically, made its mark by offering its own consistent architecture earlier on the 360 line) may seem in disarray, the giant is marshaling its forces.

Underlying hardware does not matter, Big Blue now claims. What does matter is a consistent user interface across all systems. IBM can put considerable resources behind its mouth, when it chooses to.

Big Blue this summer formed an umbrella division, IBM Information Services, charged with providing Cross-System Consistency (CSC, a phrase doomed to become a buzzword over the next few years). Stephen Schwartz, president of the Systems Products Division, estimates CSC will become a reality after a minimum of three years of development and one million lines of new code.

So competitive battle lines are drawn. DEC offers one architecture running the same software. IBM plans to offer layered software with a consistent user interface across its strategic architectures: the 370, the System/36 and 38 and the Personal Computer. Leaving small business and ancillary sales out of the picture, DEC's primary task will be to convince the top 600 companies, which account for some 80% of DP expendi-

tures, that DEC's way is superior.

Combating Big Blue promises with deliverable products is not as easy as it might seem. Despite the fact that IBM is lagging behind, the giant will recover. DEC did.

Microvax II. Performance is an issue with the Microvax II. Strategically, DEC wanted to push the Microvax price-point down as far as possible. A lower price not only opens up opportunities for selling into smaller customer sites, but it also lets DEC broaden the VAX presence within its installed base.

Despite DEC's efforts to keep the price down, the Microvax is still relatively expensive — an average of \$40,000 per system shipped, according to DEC.

To keep the price as competitive as possible, DEC used less-expensive devices, such as the Q-bus and relatively

slow disks. Under certain conditions — heavy virtual memory paging requirements or heavy disk access — the Microvax can seriously bog down.

On the other hand, the Microvax has already become so entrenched in the consciousness of the industry that its performance is used as the standard against which other vendors match their competing products.

To bolster performance, DEC introduced in July 8M-byte memory modules to top off the Microvax II at the full 16M-byte ceiling. Earlier models supported only up to 9M bytes of private memory. The greater amount of memory with which a virtual memory system

This is Ken Olsen's revenge: To succeed against his nemesis, IBM, with a consistent, compatible networked architecture.

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DEC will stretch the Microvax II family in two directions: equivalent (or slightly reduced) performance at a reduced cost and expanded performance at a constant cost. DEC has proven itself capable of both. The current Microvaxes are prime examples of DEC driving down both form factor and cost while maintaining performance.

Planned higher capacity, speedier disks will also help keep the Microvax from dragging. And it is perfectly feasible for DEC to squeeze an entire Microvax into a box small enough to sit atop a desk rather than squat beside it.

Does this mean DEC plans to plant a VAX processor on every desk? Not necessarily, although the performance issues vanish if each user has his own processor. Compare the difference in response time between a personal computer and a multiuser system.

In the general office, however, many users do not need all that local power. Besides, there are PCs and existing dumb terminals to take into account. DEC will offer two optional uses of the Microvax in the general office: as a small multiuser system for a work group or as a server and VAX gateway for networked PCs, as DEC just announced with Vaxmate and PC All-In-1.

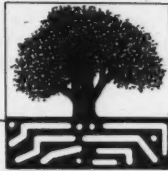
But in labs or technical offices, the situation is a bit different. Users there need not only personal horsepower but access to general office applications. Pity the engineer; the majority of his time goes not to his specialties but to administrative work such as answering correspondence.

Vaxstations. Although the Microvax will eventually elbow its way into all of DEC's application areas, the most exciting activity right now is on the technical workstation side. In addition to this market being a rapidly developing and expanding segment of the industry, it is also fresh ground for DEC, ground into which the company has eagerly dug with its new products.

In commercial markets, the Microvax is basically a smaller VAX, with access to the existing base of VMS applications and future developments. But the Microvax II-based Vaxstation IIs are DEC's first serious workstation offerings.

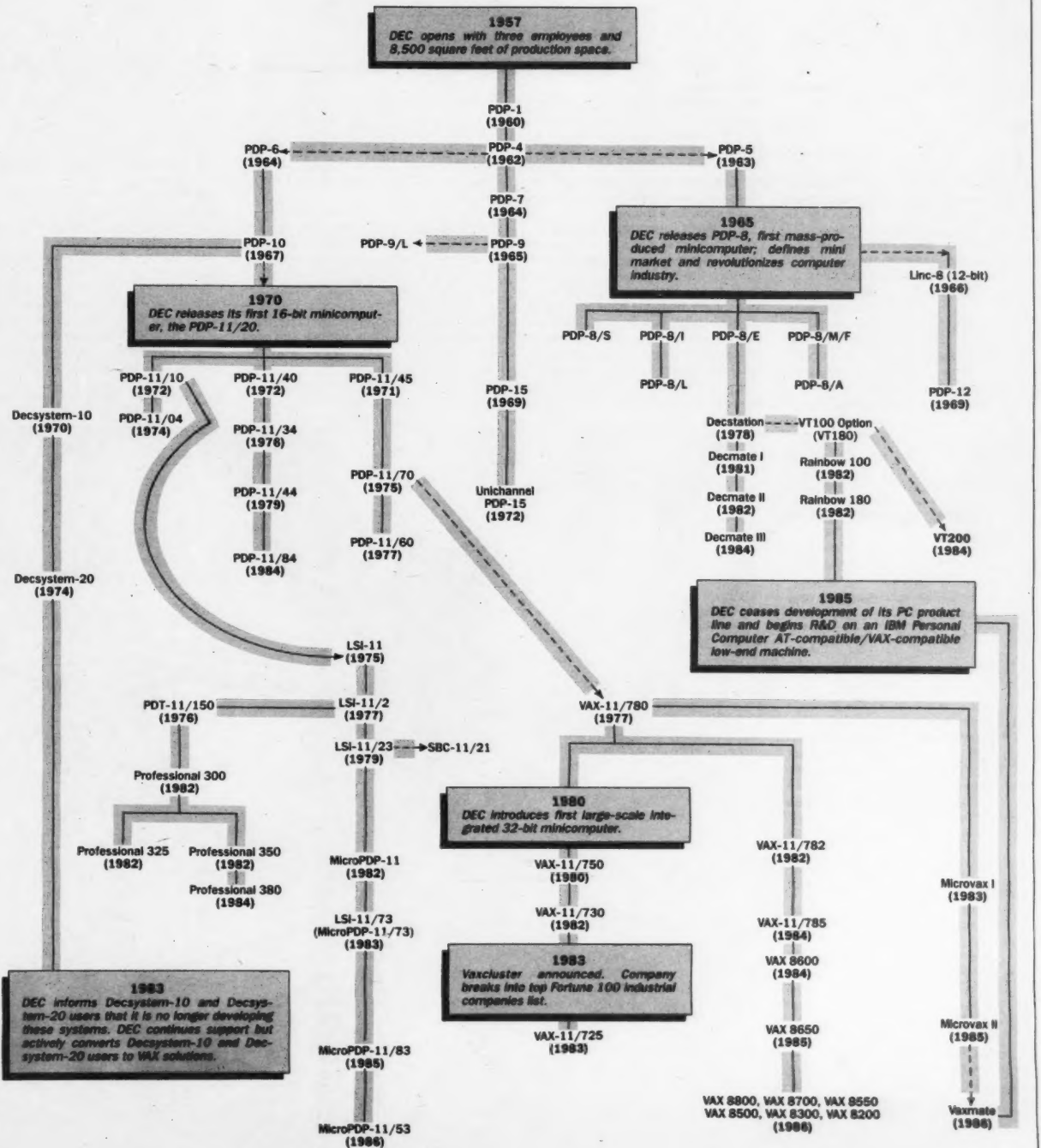
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EXTRA



MITCHELL J. HAYES

DEC FAMILY TREE



EXTRA

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DEC workstations offer three major bonuses, all stemming from the machines' status as members of the VAX family.

First, the Vaxstation can access 2,000 engineering applications developed for larger VAXs, a much larger software base than any of the competition. DEC's Computer-Aided Engineering and Manufacturing group alone offers a catalog of more than 1,000 engineering and manufacturing applications, ranging from mechanical design and drafting through integrated circuit design to modeling for seismic analysis.

Second, the DEC workstations are completely compatible with larger systems (a distinction shared by Data General Corp.).

Third, through Decnet support, the Vaxstations' networking capabilities far outstrip those of their competitors.

January of this year brought the induction of DEC's first workstation aimed squarely at the Unix marketplace: the Vaxstation II/GPX. The GPX features a very large-scale integration (VLSI) graphics subsystem that uses a graphics coprocessor churned out in the Hudson, Mass., semiconductor plant.

Implementing a range of display functions, such as vector drawing, pattern fill, clipping, scaling, zoom and scrolling, the chip operates at speeds up to 560M bit/sec. Operations are in parallel on all planes, resulting in equal performance in four- and eight-plane systems. The coprocessor now also frees up

the Microvax CPU for application-specific work.

The GPX does not offer the resolution or functionality of the VS550 family, with its Tektronix, Inc. screens and subsystems, but its \$35,000 price is much more competitive, especially given the claimed performance.

Along with the GPX, DEC produced a major enhancement of its implementation of Unix, the Ultrix 32W. Ultrix 32W

(with W standing for workstation) offers extremely enhanced windowing and graphics capabilities. Based on the X-Window package developed by MIT's Project Athena and the MIT Laboratory for Computer Science, Ultrix 32W endows GPX users with remote, network-based graphics windowing.

Previously, users could only run graphics programs locally, although systems did support remote text windows. Through the X-Window design, however, users can open up a graphics session on a remote node yet have the output appear locally. This feature allows users to distribute graphics to the appropriate host resource. For example, extremely compute-intensive simulations could run on a networked 8800 and appear on the GPX, while allowing the Vaxstation

THE 8000 FAMILY OF VAX COMPUTERS

VAX	Date of Introduction	Performance*	Bus	Upgrade From
8500	1/86	12	VAXBI	8700
8700	8/86	6	VAXBI	
8650	12/85	6	SBI	8600
8600	10/84	4.2	SBI	
8550	8/86	6	VAXBI	8500
8500	4/86	3	VAXBI	
8300	1/86	1.9	VAXBI	8200
8200	1/86	1.0	VAXBI	

* Performance rating based on the 11/780=1.

Information provided by the Office Computing Group.

to work locally on other tasks.

One year after the Microvax II debut, DEC had the foundation for an entire family of medium- to high-range technical workstations with access to both the VMS and standardized Unix worlds.

But DEC still had no low-end package. IBM did: the RT Personal Computer. DEC countered in April with a new entry-level Vaxstation family, the RC.

Available in two fixed packages of either 3M bytes or 5M bytes, the RC costs either \$14,995 or \$16,995. Finally, DEC has a price-competitive, entry-level engineering workstation that still offers compatible interconnection with a much larger architecture.

Recent press reports have buzzed about the expected DEC Vaxstar — a

"portable" Microvax-based engineering workstation. Designed primarily for a single engineer who needs number-crunching power on a desktop, the Vaxstar also will support a few ancillary users through a separate terminal I/O processor.

Not to be outdone by their micro product counterparts, DEC's VAX engineers, after hopping through innumerable hoops to achieve what they wanted, began the barrage of follow-ons in the 8000 series. December 1985 brought the 8650.

Then, over the next eight months, DEC unleashed six major new VAXs, replacing the still-young VAX-11/785 in the process. A jubilant Ken Olsen, when asked about the short lifetime of the VAX-11/785, smiled wolfishly and said that DEC was in the business of making its own products obsolete.

The 8000s. Especially over the last year, DEC has begun taking one of three price/performance directions with its hardware developments:

■ Offering the same performance at reduced cost.

■ Offering more performance at constant replacement cost.

■ Offering greatly enhanced performance at higher cost.

Members of the 8000 series have rolled out at an astonishing rate: six new VAXs this year. The eight members of the 8000 series are paired off and reflect DEC's price/performance strategies.

The 8200 is a companion machine to the 8300. The 8500 and the recently released 8550 go together, as do

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New slogan, new strategy

During the past few years, DEC has based its marketing strategies on various themes. First, it was the all-out VAX promotion of "one company, one strategy, one message." Then came the "challenge of filling the world with networking," culminating in the "Digital has it now" slogan unfurled at Decworld '86. With its product arsenal fully stocked, DEC moved on to conquer territories with "industry marketing" (see p. 73).

This is the same vertical marketing attack other vendors have chosen. On the office side, the clearest examples of this approach are the increasing number of specialized All-In-1 systems.

DEC offers four such systems with perhaps another 10 or so in the works. Current versions include systems for sales and marketing, business operations, employment management and telecom management. DEC is providing the vertical market software as

Given the price/performance and power of its newest mid-range processors, the 8550 and the 8700, DEC feels even better prepared to battle IBM for the middle tier in large corporations.

well as the horizontal All-In-1 foundation.

The All-In-1 systems also give the Microvax a little extra leverage. DEC has an image of distributed Microvax systems working away at their various vertical applications in discrete clusters yet networked up to a larger host processor, such as the 8500 running network management, software and user administration, financial consolidations and mail.

There is no real difference between the capabilities of the Microvax and the larger VAX boxes, with, of course, the obvious exceptions of size and performance. Although it is the Microvax's best feature, this compatibility makes the distinction of the product on the basis of VMS application offerings impossible.

The Microvax is simply a VAX, albeit a small one. But by using the size and accompanying price point of the Microvax II to break through the ice of previously frozen markets, the Office and Information Systems crew at DEC can expand the VAX base.

Now, especially given the price/performance and power of its newest mid-range processors, the 8550 and the 8700, DEC feels even better prepared to battle IBM for the middle tier in large corporations.

DEC is also beginning to turn the screws on third-party vendors that once thrived by supplying less expensive peripherals and add-ons such as

memory arrays. Earlier in the year, the memory card vendors complained that DEC was structuring its deals in such a way that buyers had to get their memory expansion from DEC, not from other sources. Now DEC is clamping down even harder with its proprietary VAXBI bus.

DEC is allowing only about 70 vendors to make devices for the VAXBI. For major VAXBI devices such as disk drives, printers, network interfaces and so on, buyers will have to go to DEC. This strategy translates into more revenue for DEC; higher prices, most likely, for end users; and a dwindling income for manufacturers that had hoped to piggyback on DEC's success.

Most corporations, especially large ones, are trying to establish long-term relationships with a small number of suppliers. Fortunately for DEC, many of these same corporations also consider DEC one of the strategic vendors.

"By focusing on those 600 [top companies] in depth and breadth and achieving greater penetration there, rather than spreading our efforts over about five million accounts, we can get a tremendous market share increase," notes Gerry Witmore, DEC's vice-president of Basic Industries Marketing.

Managing is now more important than feverish growth. DEC is concentrating on order administration and delivery and on packaging its products so as to help both the sales force and the customers.

DEC prepackages everything now, including networks and VAX systems. Today, VAXs come in pre-established configurations. The 8550, for example, has four configurations: stand-alone, Vaxcluster, All-In-1 and preconfigured. DEC also offers seven standard local-area network (LAN) packages that can be used individually or as building blocks in larger networks.

DEC offers another special incentive, called Netcare. It is a program through which DEC will provide multivendor network maintenance — not to be confused with management.

In other words, if you have non-DEC devices incorporated into your DEC network, the company will assume responsibility for their maintenance.

DEC will serve as the customer's single point of contact for service, including fault identification and isolation, vendor notification, response tracking, and post-service verification that service was properly performed.

Essentially, DEC will either perform the service itself, which is limited to DEC and some compatible equipment, or subcontract with the vendor in question as required. All told, these moves really turn the screws on independent LAN vendors hoping to sell into DEC's base. As Netcare is logistically ambitious, if not adventuresome, DEC will be rolling the program out slowly, starting in the Northeast.

No less ambitious in principle, although certainly so in scale, is DEC's commitment to respond to service calls for the 8000 series within two hours.

— Patricia Seybold
and Michael Millikin

■ CONTINUED FROM PAGE 26

the 8700 and the high-end 8800. In theory, users will be able to upgrade within each pair from the lower machine to the higher, although not all upgrades are available as yet.

At first, DEC tended to position the lower machines as suitable for the office and for general computing applications, with the higher performance mate serving as a processor for computation-intensive environments. But these distinctions can blur. One of the basic configurations for the 8550, for example, is as an All-In-1 office automation system.

Still, DEC seems intent on keeping the price/performance curves of the higher and the lower systems relatively parallel. The noticeable maverick in this scheme is the 8500, the price point of

which moves suddenly upwards on an otherwise consistent plot. Of the entire family, the 8500 is the most costly in terms of performance. Perhaps DEC is leaving itself some room for discounting.

VAXBI. Although not even 2 years old, the Venus 8600 already is technologically behind its successors. Along with the 8800, DEC rolled out its high-performance VAXBI I/O bus. According to DEC, the VAXBI is capable of supporting usable data rates up to six times that of the Unibus. By supporting up to four such buses in the high-end VAXs (the 8700 and 8800), DEC can provide up to 30M bit/sec. aggregate I/O.

All the members of the 8000 series introduced this year (8200, 8300, 8500, 8550, 8700 and 8800) use the VAXBI. The older 8600 and 8650 still use the SBI bus with its support for older peripherals.

DEC recently announced a VAXBI bridge for these older systems so that they can take advantage of peripherals designed for the newer bus structure.

In its August product announcements, DEC unveiled a host of VAXBI technologies: an I/O subsystem, a Unibus adapter, a Vaxcluster port, a disk adapter, a high-speed tape adapter, an Ethernet port, a communications adapter, 2M- and 4M-byte memory arrays and Ultrix over the VAXBI. Clearly, DEC is shifting to the VAXBI bus while helping to preserve its customers' investments.

Vaxcluster. The Vaxcluster gives DEC entry into MIPS-hungry environments. Using a 75M bit/sec. Computer Interconnect (CI) bus, users can hook together up to 16 VAXs into a transparent, working system providing redundancy and mainframe-like processing power. Theoretically, users could hook together a cluster of 8800s for a system that would provide 100 times the processing power of a VAX-11/780 and more than 100G bytes of storage.

Vaxclusters have proven extremely popular. DEC has installed at least 3,000 Vaxcluster networks linking 9,000 VAX processors.

DEC estimates that three quarters of the 8600s and 8650s shipped go into Vaxclusters and expects the 8700 and the 8800 to land there too.

No upper-end CI enhancements have appeared yet. But at this year's DECUS user group gathering in May, a technical demonstration showed a group of Microvax II systems acting as a Vaxcluster but running over Ethernet.

This type of network-based micro clustering would not be fettered by the existing CI distance limitations, only by those of Ethernet. Standard CI is limited to a 45-meter radius. Alternately, an Ethernet-based cluster can range out 2,800 meters or farther if LAN Bridge 100 units are used.

Although this demonstration exhibited capability and not an announced product, many expect DEC to announce micro clustering along with the Vaxstar engineering workstation.

Decnet. Changing deep-seated beliefs is like turning an oil tanker 180 degrees. It can be done, but it takes time. DEC had done just this with perceptions of its network products and strategy. Two years ago — roughly the time IBM announced its Cabling System and Token-Ring local-area network —

Theoretically, users could hook together a cluster of 8800s for a system that would provide 100 times the processing power of a VAX-11/780 and more than 100G bytes of storage.

DEC was considered a distant second, if it was considered at all.

But the company has been successfully carrying out a series of evolutionary moves with its network, beginning most significantly with the early adoption of Ethernet in 1980 and culminating with the announcement of Decconnect.

Today, it is IBM that is struggling to keep pace, being forced to announce products far in advance of delivery dates, purportedly to give users time to plan. This turn of events has been brought on by two factors: the explosion of distributed processing and personal computing via powerful VLSI technology and the increasing requirement for local-area network (LAN) integration to smooth communication among these computers.

Many other factors have contributed as well. DEC's processor line is unsurpassed in range, price/performance and compatibility. This compatibility includes the requisite IBM gateways, in which DEC took an early lead. Moreover, Ethernet has finally become fully accepted as a robust technology. No longer is "asynchronous" a dirty word. DEC's utilization of LAN technology and the richness of Decnet's Digital Network Architecture (DNA) protocols are a triumph of technology over marketing.

Open Systems Interconnect. DEC has also chosen to carry the Open Systems Interconnect (OSI) banner to the front lines. DEC now offers a full seven-layer (as in functional and self-sufficient) OSI protocol suite as an alternative to DNA. Though the two protocol stacks must be run side by side today, eventually International Standards Organization (ISO) protocols will become Decnet. Intel Corp. and Ungermann-Bass, Inc. have been offering an ISO transport called Opennet, but it is not yet a complete networking environment.

Despite holding a very strong position with its DNA protocols, DEC is aggressively pursuing a full migration to OSI. This move is not altruistic.

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EXTRA

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As things stand now, all vendors seeking a common ground must genuflect to IBM's Systems Network Architecture (SNA) and Distributed Office Support Systems (Disoss). OSI is an alternate common ground not owned by IBM.

DEC's DNA protocols are already well matched with OSI, and its protocols are largely peer in nature. This process began in June 1985 and is to be complete in June 1988.

The stakes are different for IBM. The success of the IBM Personal Computer and the proliferation of small systems in general forced IBM to undertake a massive retrofit of SNA from its hierarchical (for example, terminal/slave to host/master) origins.

The major result of this effort to date is the LU6.2 Advanced Program-to-Program Communications (APPC) and PU2.1 protocols. The development and acceptance of these protocols is of fundamental importance to IBM.

In addition, IBM's SNA gives it the strategic high ground, and IBM is not about to come down off this mountain for more than an occasional day trip. No matter how good DNA is, DEC knows it cannot elevate its role to this status. Only ISO has a chance to play this role.

But the ISO needs a champion. Aside from having provided vaporware thus far, the ISO's major shortcoming has been its lack of a strong supporter. DEC has decided to play this role, being one of the few vendors with the resources to keep pace with both its proprietary and OSI protocols simultaneously.

Users will be able to look to OSI, and thus to DEC, for an alternative to SNA and Disoss. DEC is repeating the role it played in boosting Ethernet to its current status.

In the context of the current battle for supremacy at the departmental level, the implications of this movement are huge.

Large IBM users will have a fundamental strategic choice to make. Is SNA to be the dominant backbone network, providing a common gateway to which other networks can adhere? Or will departmental networks gravitate toward the ISO, creating a single, more efficient yet multivendor network that can operate independently of SNA or with it via a gateway?

In existing terminal-to-host SNA environments, the ISO will not be a factor. In host-to-host environments in the commercial market, IBM will have to provide much higher throughput solutions than those currently announced if it is not to lose some leverage.

The key will be IBM's ability to provide sufficient network management tools not resident

in the 3725 front end similar to those already present for Series/1 servers or Token-Ring PC networks.

Already, there is a grass roots movement afoot building networks using IBM's own PC LAN-oriented Netbios applications interface. Though developed by IBM, PC-DOS and Netbios no longer give IBM strategic leverage.

A large percentage of IBM's customers will stay with SNA wherever possible, especially in

centralized environments. Yet many users with distributed, multivendor environments will not be well served by passing traffic between sites through Disoss instead of directly from site to site.

Most gateways eat throughput for breakfast in accomplishing their translations. To date, this fact has enabled IBM to lock many of these distributed sites into the Big Blue fold. The ISO will give these users more freedom to choose.

Even without the strategic leverage SNA provides IBM, IBM will still win more battles than it loses. But the playing field will be leveled considerably.

It is very important not to get carried away with the ISO's prospects. It will be a few years at least before the ISO's standard can match SNA for network management and security, two issues of vital concern for users. The X.400 protocol needs distributed directory and

mail management facilities as well.

In the meantime, ISO networks will have to rely on proprietary extensions to handle these needs. This is where DEC sees its leverage as an ISO provider. DEC plans to use its proprietary DNA protocols as an ISO superset. Even when these are in place, the user interface will continue to provide differentiation.

Decnet. Decnet has progressed through four phases,

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Arguably, Decnet Phase IV is both physically and logically the most advanced network in the industry.

the current version being Decnet Phase IV. Arguably, Decnet Phase IV — using Ethernet as the transport — is both physically and logically the most advanced network in the industry.

One area that does need beefing up, however, is network security, according to some users. Decnet Phase V is scheduled to incorporate encryption and extended network management.

Each of the earlier phases,

which were point to point instead of Ethernet-based, is still compatible with Phase IV. Phase IV first shipped in 1983. By the end of 1985, DEC had installed 3,700 networks with 206,000 devices on them (not counting hard-wired terminals attached to CPUs or DEC's internal installations).

DEC says that as of March, this number had risen to 5,500 customer locations with 73,000 Ethernet nodes (not including terminal server ports or hard-

wired terminals). Of these nodes, 50,000 are CPUs; the rest are terminal servers, routers and gateways. Currently, DEC is shipping 4,000 terminal server ports and 650 CPU connections per week.

SNA gateways. Last but not least is DEC's palette of SNA protocols. There are 10 of them, ranging from IBM 3270 Personal Computer terminal emulation to an LU6.2-based Disoss interface with revisable document exchange supported via

Document Interchange Architecture/Document Content Architecture protocols.

The one limitation of the Disoss interface is that it does not yet implement PU2.1. Without both LU6.2 and PU2.1, a full SNA Distribution Services store-and-forward participation is not possible.

The practical result of this limitation is that a Decnet user can only send messages to a single, specified Disoss node. For example, the SNA Gateway supports two 56K bit/sec. lines, but the user must choose one or the other.

Thus, instead of being able to send a message to the nearest Disoss node and have it forwarded to its final destination — which could be across the country — the message must go directly to its final destination.

There are two problems here. First, transmissions between a Decnet and an SNA network may be far more expensive because they cannot travel on lines already in use between Disoss nodes.

Second, if the recipient has moved to another node, there is no way to forward the message automatically. DEC is expected to overcome this limitation shortly.

In the meantime, there are few IBM users with multiple Disoss nodes in full production use, so few users will find the limitation significant.

Although not the first systems vendor to integrate LAN technology into its network architecture, DEC boasts the best overall network in this respect today.

Furthermore, DEC appears to be picking up the pace. DEC's new line of Microvax and VAX processors comes with a built-in Ethernet link.

On the downside, DEC's cabling scheme, Deconnect, is too closed, unless you are absolutely certain you are going to put in Ethernet. As for sins of omission, IBM's Netbios is a short-term must.

Otherwise, DEC's move to provide single-source maintenance service for multivendor networks and its aggressive championing of OSI speak well for the company's strategic vision.

As satisfied as many buyers are with DEC's products, many are also waiting to see what IBM does during the next few years. Distributed systems are the issue.

■ CONTINUED ON PAGE 31

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EXTRA

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Consider the situation DEC is creating by propagating Microvax nodes throughout a company. Who manages each system?

DEC's vision encompasses professional systems managers, not hordes of PC-style hackers. Support by a central manager is one of the key differences between end-user computing DEC-style and PC-style. Sophisticated, centralized tools for distributed systems management are a must.

DEC recently began addressing this need with the first release of its Remote Systems Manager (RSM). RSM, which runs on a VAX or Microvax CPU, simplifies the management and use of multiple networked Microvaxes.

Formerly, software installation and maintenance had to be done at each CPU. Now, RSM tools let one system manager perform all these functions (including installation, backup and updates) from a central location.

In addition to managing applications as well as providing a centralized print queue, RSM handles network tasks such as the propagation of VMS logical names and Decnet data base changes.

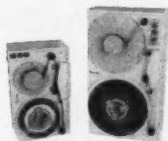
With RSM, users can exploit the power of a distributed VAX architecture, while leaving the burden of system maintenance to the managers.

The future. In just a few years, DEC has extricated itself from a sticky situation and taken a strong No. 2 position in the industry. In terms of gross revenue, the new Sperry Corp. and Burroughs Corp. combination ranks second, but DEC is determined to capture the No. 2 spot once again.

And many DEC executives (some not so secretly) are nurturing the dream of capturing IBM's flag — of being No. 1 in

Seybold is president and editor in chief of Patricia Seybold's Office Computing Group. Millikin is associate editor and a consultant at that firm. David Terrie, also a consultant, assisted in preparing this report.

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As satisfied as many buyers are with DEC's products, many are also waiting to see what IBM does during the next few years. Distributed systems are the issue.

overall revenue and profits in 20 years or so. DEC has the products and the internal resources to conquer a sizable chunk of the middle tier of medium-scale computing.

But although IBM might ship fewer mainframes than DEC ships minicomputers, IBM's margins are higher. DEC has to work harder to pull in equal amounts of profit on hardware sales.

One of DEC's quirks as a systems

vendor has been its obdurate refusal to bow to the inevitable as far as PCs are concerned. While DEC's Rainbow is a slick piece of hardware, it is not 100% IBM PC compatible.

Given DEC's past attitude, the new 80286-based Vaxmate is a watershed of sorts. The Vaxmate sports a built-in Ethernet board. This move makes sense for DEC as the PC AT clone, which also has a DEC superset keyboard, will only

be sold to DEC accounts and not through the retail channel. Bundling the LAN board could enable DEC to offer its PC as a LAN node for less than an IBM PC and a 3Com Corp. board purchased separately.

But these options still stop short of a more complete integration of PCs into DEC's architecture. Despite its traditional loathing of the IBM PC, DEC probably will end up offering a service along those lines. If it does not, other vendors will.

IBM may be slow, but it certainly is not stupid. The company does respond to market pressure. As satisfied as many buyers are with DEC's products, many are also waiting to see what IBM does during the next few years. Distributed systems are the issue.

DEC has thrown down the gauntlet; IBM is busy formulating its response.

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THIRD PARTIES DRAW LIFE FROM VAX

BY CLINTON WILDER

Success in the computer industry often creates a snowball effect. When a major CPU vendor sees its sales taking off, dozens of third-party companies offering software, peripherals and OEM turnkey systems jump into the hot market. Successful third-party products in turn generate more customers, which attract the attention of even more vendors.

In a nutshell, that is what has happened to the market for DEC products during the company's current renaissance as the industry's high flyer. While vendors ranging from AST Research, Inc. to Cullinet Software, Inc. are buying or developing their way into the DEC market for the first time, hundreds of traditional third-party DEC suppliers are expanding their offerings to become more competitive.

"It flows from what's going on in the VAX area," says Steven Barth, vice-president of marketing for Expoconsul International, Inc., sponsor of the DEXPO trade shows for third-party products. "DEC has made the final transition from the PDP-11 to the VAX

line. That creates a large enough market for software, for example, that many companies are bringing their products over. They're looking at specific areas where DEC is making inroads and saying, 'We can add one to that.'"

The most notable arena where DEC has made inroads recently is the mainstream MIS world of data base management systems, office automation and transaction processing. The presence of traditional IBM mainframe players like Cullinet, Cincom Systems, Inc., Software AG and Information Builders, Inc. in the DEC marketplace testifies to DEC's increasing acceptance in the Big Blue world.

"The commercial marketplace is the fastest growing part of DEC's business," says Ron Nordin, president of Cognos, Inc., an Ottawa fourth-generation language vendor. Cognos ported its Powerhouse applications development system to DEC's VMS early in 1985 and now markets the package jointly through DEC's Cooperative Marketing Program (CMP) for third-party vendors.

Nordin cites DEC's full VAX product line compatibility as a major advantage for selling application development tools to DEC users. The DEC version of Powerhouse currently accounts for about 30% of Cognos's sales, but Nordin expects that percentage to increase greatly in the next two years.

"With VAX and Decnet, they are in a position to have applications running from the desktop to clusters up to 100 million instructions per second," he says. "It's a very powerful range in which to have virtually identical applications."

The highly successful Microvax II has also provided an entry for third-party players because of its market acceptance, relatively low price and physical size. It becomes easier to market a turnkey system on a CPU that, in the words of one OEM, "You can put in the back of

■ CONTINUED ON NEXT PAGE

EXTRA

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a station wagon when you make sales calls."

"The fact that the end market has been so enthusiastic has spurred third-party development for the Microvax II," says Eli Lipcon, DEC's Direct Channels Group manager. "You can have products that are technically hot, but if the market doesn't accept them, they won't be liked by third parties. Those vendors want to take the path of least resistance to their own

goals," Lipcon adds.

The growth in the third-party market is partially a result of DEC's inability to successfully enter the microcomputer arena, according to Ron Howard, president of Datability Software Systems, Inc., a New York-based vendor of micro-mainframe communications for the DEC market.

"DEC has addressed the large systems problems effectively, but they have created many opportunities for soft-

ware companies to create innovative new products for their line," Howard says. "Their computer architecture lends itself to linking multiple computers together for distributed processing, but it doesn't address integration of microcomputers into the computing environment."

By overlooking such areas, DEC has inadvertently created niches in which third-party vendors can thrive under the right conditions. But that mar-

ket is becoming increasingly crowded, Howard says.

"Because the low-end VAX machines are affordable and simple to use, more small start-up companies don't have to spend a million dollars just to develop products," Howard says. "As a result, a lot of small companies are coming out with products for DEC, and there will, of course, be a shakeout period."

Not all of these niches will continue to be overlooked by

DEC, however. The company learned from previous micro failures such as the Rainbow and is becoming more aggressive in that area, according to Dan Azulay, managing director of Coefficient Systems Corp., which manufactures a DEC VT220 terminal emulation package for the IBM Personal Computer series.

"DEC is becoming more successful in connecting minicomputers to microcomputers, particularly as local-area networks become more integrated into communications," Azulay says. "They will be vying for IBM's microcomputer market share again and for the whole micro-mainframe communications arena, with a DEC minicomputer at the middle. This means that whole market will be more

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The growth in the third-party market is partially a result of DEC's inability to successfully enter the micro arena.

— Ron Howard
Datability Software
Systems, Inc.

competitive for everyone."

Although the VAX market is one of the most competitive in software sales, VAX customers are more decisive and less worried about spending money than mainframe customers, says Lone Cockrell, president of marketing for the SAS Institute, Inc., a software vendor of products for the VAX and Microvax II.

"There's a lot of questioning and justification needed by customers in the mainframe market right now," Cockrell explains. "Because the VAX machine is less expensive and used for specific departments or purposes, those looking at a VAX have money in hand and are ready to make decisions. There are fewer people involved in the decision process, so there's only a limited number of people you have to talk with."

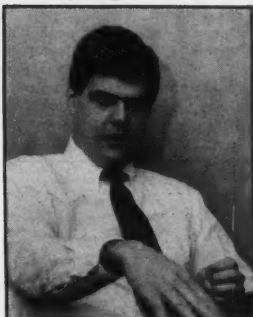
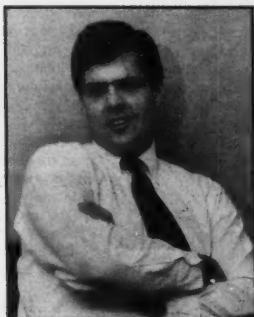
Within this burgeoning marketplace, DEC itself is pursuing a mixed strategy. While it has expanded its CMP efforts to recruit third-party partners, particularly in vertical markets, it has aggressively fought third-party competitors.

On the technology front, DEC essentially closed the architecture on the VAX machines that it introduced since January with the synchronous VAXBI bus. The previous Q-bus and Unibus are asynchronous, making it easier for third-party firms to develop DEC-compatible products for

■ CONTINUED ON PAGE 36

"When trying to reach VAX users, Computerworld gets results."

R. Stephen Lilly
Director of Marketing
Computer Information Systems
Braintree, MA



Steve Lilly, Director of Marketing for Computer Information Systems (CIS), had set a clear enough goal: he wanted to introduce CIS' system management software, Quantum RS, to the marketplace and explain how it is used for VAX resource tracking, capacity planning and resource/cost allocation. Steve delivered his message in Computerworld as well as in other trade publications. He quickly discovered that Computerworld does, indeed, get results. "Computerworld has helped CIS reach its target audience — the decision-making systems managers who are current and future users of VAX systems," he says. "Basically, Computerworld readers are serious buyers; if they inquire about a product, they're a viable lead — and often a sale."

Steve is sure about this because CIS tracks its leads with an in-house marketing system.

"We've found that Quantum RS generates a tremendous amount of interest, but CIS' sales department is dependent on the quality — not quantity — of responses. And we know Computerworld delivers quality — which added to Quantum RS' sales increase of 218 percent last year," Steve says.

One reason CIS has relied on Computerworld over the last two years is Computerworld's diverse coverage. "Computerworld covers the industry. Today's corporate DP shop is more of a mixed-vendor environment than it was in the past. In growing numbers, corporate users are utilizing IBM PCs and ATs for microcomputing and

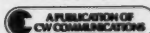
DEC VAX systems for departmental and mainframe computing," notes Steve. "Based on this, we've found Computerworld to be a very effective vehicle to reach VAX users, especially in large DP environments."

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EXTRA

■ CONTINUED FROM PAGE 34
the earlier VAX systems.

"Why give the technology away to someone who didn't make the investment?" DEC founder and President Ken Olsen said in response to a recent question about the closed VAXBI bus. "The better question would be, 'Why did we open it in the first place?' I don't remember. It was sloppy business."

DEC also sent a message to third-party component vendors by aggressively pursuing legal efforts on alleged patent infringement. Emulex Corp., which has several ongoing legal battles with DEC over its DEC-compatible controllers and subsystems, believes DEC's efforts have increased in the past year.

"They have developed much more competitive products on the CPU side, but the peripherals divisions are relying on the court systems," says Emulex

Chief Financial Officer Michael Lewis. "Other competitors have been reluctant to enter the DEC peripherals market because of what they see. In pursuing those markets, we feel that our legal position is strong, but clearly there is a price to pay."

Companies enjoying cooperative arrangements with DEC sometimes have complaints stemming from DEC's often confusing organizational structure.

"There are a hundred companies called DEC, each with its own vision and priorities, and that makes dealing with them very difficult," Datability's Howard says. "You are dealing with one microscopic piece of the company which might be counter to what the other pieces want to do."

This situation creates problems for a third-party vendor attempting to obtain prerelease versions of new DEC operat-

ing systems, Howard observes. But most third-party vendors say such challenges are worth facing because of the potential profits in the expanding DEC market. DEC may be taking steps that make things more difficult for some vendors, but that means it is going after a larger piece of an increasingly larger pie.

"DEC as a competitor has made it tougher to sell our products," says Jack Olson, vice-president of sales and marketing for Able Computer, a manufacturer of communications products for the VAX. "But as an innovator, DEC has expanded the market with its new series of computers. So even though the market is tougher, it's going to be even better than it was in the past."

Wildier is Computerworld's senior editor, computer industry. Computerworld correspondent James A. Martin contributed to this report.

Third parties thrive at DEXPO

The following products will be introduced at DEXPO West '86, Oct. 7-10 in San Francisco at the Civic Center. The show, which is expected to draw 300 vendors, is organized by Expoconsul International, Inc., 3 Independence Way, Princeton, N.J. 08540. DEXPO is being held simultaneously with the Digital Equipment Computer Users' Society (DECUS) symposium at the Moscone Center. The two events are not affiliated, but as in the past, DECUS members will receive free admission to DEXPO and shuttle-bus service between the Civic Center and the Moscone Center.

RS/Explore and RS/Discover, two multiuser software systems that offer engineers and scientists assistance with data analysis and experimental design, will be unveiled by **BBN Software Products Corp.**

RS/Explore combines the full functionality of RS/1 with a statistical advisory component.

RS/Discover is an integrated software system for the creation of analysis of designed experiments in industry. Both products from the company's RS series are based on the capabilities of RS/1. Booth 1311.

Equinox Systems, Inc. will show the MDX-1 Micro Data PBX, a local networking solution for small applications.

The MDX-1 allows keyboard-controlled switching and port sharing for up to 16 terminals, personal computers and computer ports operating simultaneously at 19.2K bit/sec. It can also be used to allow terminals and PCs to share costly peripherals such as printers and modems.

The MDX-1 is a low-end addition to the Equinox range of data private branch exchanges and features the same attributes of simple installation and user-friendly, menu-driven configuration as its larger brothers, the DS-5 and DS-15 PBXs. Booth 604.

Project Visibility System (PVS) Release 9.0, the project management system for VAX users, will be unveiled by **Xebek Corp.**

PVS 9.0 produces presentation-quality network diagrams, bar charts and resource histograms — all of which can be viewed on DEC VT240-compatible terminals using the software's windowing technology.

The plotted output from PVS is sophisticated as well as easily customized, and the system as a whole is user-friendly. PVS Release 9.0 will be demonstrated on the Microvax II. Booth 1733.

Tecex will introduce the TEC-OAS/1 Optical Archiving Subsystem for the VAX series of architectures, from the Q-bus Microvax II on up to the Unibus 8650 series of processors.

Utilizing a standard Mass Storage Control Protocol/DU-Driver and Files-11 QIO processor, the TEC-OAS/1 can be used as a standard VMS ODS-2 file structured device. No patches or changes to existing DEC software device driver or utility packages are required.

Integration to a host CPU environment is accomplished via a Q-bus or

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Unibus host adapter, emulating a standard UDA50 magnetic disk controller.

Up to eight optical peripherals can be daisy chained on a single host controller. *Booth 1411.*

Softool Corp. will demonstrate the newest version of its Change and Configuration Control environment (CCC). This version offers an additional interface to CCC that provides for a complete turnkey solution to the configuration management problem. The menu-driven approach allows CCC to furnish immediate results with minimal staff training.

CCC is the only complete automated configuration control tool available today. It automates the management of changes and versions, control over who makes what types of changes and where, tracking of trouble reports, reconstruction of previous versions, document control and more.

Softool will also demonstrate its Programming Environment and Fortran Automatic conversion tools. *Booth 812.*

Pennington Systems, Inc. will unveil an assembler-to-C program translation service, available on a contract basis.

Pennington will demonstrate its translation capabilities using its XTran translation utility. The initial implementation translates DEC PDP-11 and VAX-11 assembly code to the C programming language.

Assemblers for other popular mini-computers will follow, along with other combinations of both low- or high-level programming languages. *Booth 2113.*

MCBA, Inc. will feature its newest VAX Cobol package, Fixed Assets and Depreciation (A/D), running on DEC computers.

Written in Cobol and running under VMS on VAXs, the A/D package handles basic accounting functions for asset acquisition, asset retirement and periodic calculation of depreciation.

A/D supports up to nine sets of independent books and all commonly used depreciation methods. The A/D package is the first in a series of new VAX Cobol products, which will be MCBA's most functional release yet. When complete, the VAX Cobol system will feature complete software for accounting, distribution and manufacturing applications. *Booth 1704.*

The Mobius Presto line of micro to host integration products will be introduced by **FEL Computing Co.** The latest version of the Mobius Micro and Host Integration System will allow users to operate with a variety of high-speed links and networking options.

Complex configurations involving networks, clusters and peripheral devices are facilitated by Mobius Presto. The product line provides users with the full power of Mobius with dramatically higher throughput.

Mobius users can now operate with high-performance terminal emulation, 26 definable drives, reciprocal personal computer/host transparency and full task-to-task communication from within the broadcast range of communication architecture. *Booth 940.*

Disc Instruments Co., the developer of the DBL programming language, will announce the release of DBL/RSX Version 4.

This upgrade to Disc's DBL/RSX product will include the following added features: software virtual memory, multikey ISAM support, a fixed-point

data type and terminal-independent screen functions.

As a superset of the Dibol programming language, DBL allows the universe of existing Dibol and DBL-based applications packages to be ported to any of the operating systems on which DBL runs, including Microsoft Corp.'s MS-DOS, Novell, Inc.'s Netware and Unix.

In addition, applications written in DBL may be ported to the same environments utilizing only one version of program sources. *Booth 323.*

Computer Intelligence will announce the availability of on-line access to its VAX Lead Qualification Program, a data base that contains information on computer equipment at DEC sites in the U.S. and Canada.

This product offers Computer Intelligence clients a flexible, effective way to perform a variety of target marketing functions. *Booth 2149.*

Chrislin Industries, Inc. will exhibit its recently introduced high-capacity memory for the Microvax II. The CIMV16 is 16M-byte parity memory all on one card.

The module uses 1M-byte dynamic random-access memory (RAM) chips and, therefore, consumes one-fourth the chips of modules with 256K-byte dynamic RAM chips.

All 16M bytes in one card slot relieve a slot for other needed modules. The board is 100% hardware and software compatible with the Microvax II and takes full advantage of the microcomputer's speed. *Booth 1633.*

American Photonics, Inc. announced an 802.3 Ethernet-compatible repeater series. The new repeaters are designated RL6000L (wire) and RL6000R (fiber).

The RL6000R allows DEC users to connect Ethernet segments over all the fiber sizes, a capability especially useful for wiring buildings in a campus environment. The RL6000L is an 802.3 local repeater used to connect many segments of Ethernet cable.

The RL6000R is two half-repeaters that use all standard fiber-optic cable sizes. The product will function equally well with Ethernet Version 2 and 802.3.

Standard features include segmentation, thorough diagnostics and an easy-to-read LED display indicating collisions, heartbeat and fiber continuity. *Booth 1705.*

Syntax is set to introduce product configurations and pricing for its VAX Interface Manager (VIM) family. These products allow IBM Personal Computers to work together in a high-performance Ethernet local-area network using any VAX system running VMS as a file, print, electronic mail and virtual terminal server.

New product configuration is now available for less than \$500 per PC. Syntax will demonstrate this configuration along with its recently announced VIM Subroutine Library and its VT220 emulation system. *Booth 240.*

Systems, Inc. will unveil a controller design, the SMDC. The SMDC is a dual-width LSI-11/Microvax II compatible with data transfer rates up to 25M bit/sec.

The SMDC provides the following: a 1M-byte dual-ported data cache, micro-code stored in electrically erasable, programmable read-only memory and an intelligent port for tape, optical disk and user service port. *Booth 1505.*

Primavera Systems, Inc. is scheduled to demonstrate the Primavera Project Planner (P3), project management and control software using critical path scheduling.

P3 offers project managers extensive resource, costing, graphics and reporting capabilities for projects of 50 to 10,000 activities. P3 handles precedence and arrow networks and offers custom reporting with user-defined sort, selection, content and format.

P3 reports progress using actual start and finish dates, actual expenditures or resource usage. Completed, under way and planned activities can be compared with targets. P3 offers on-screen bar charts, resource/cost histograms and resource/cost profiles by time period or activity grouping.

Primavera will also demonstrate Primavision — plotter graphics interfacing with P3 to produce time-scaled bar charts and network logic diagrams for project coordination and management review.

Primavera Project Planner and Primavision are available for the Microvax II and other VMS environments. *Booth 1840.*

Dataproducts Corp., an independent supplier of computer printers, has expanded its offerings of printer repair services. Now available from the Customer Services Division is the Subassembly Repair Service Price Catalog. This July-edition catalog features an extensive OEM printer model cross-reference list and more than 4,000 repairable parts including those of Ampex Corp., Control Data Corp. and many others.

All printer models are covered including the latest laser model. Also covered is the availability of printer supplies, model conversion and remanufacture options. *Booth 1540.*

IMSL, Inc., maker of advanced numerical software, has released Edition 1.0 of PDE/Protran. This member of the Protran problem-solving environment solves systems of linear and nonlinear elliptic or parabolic partial differential equations.

As the successor to IMSL's Twodep, it has most of the capabilities of Twodep, plus greater flexibility and product enhancements.

PDE/Protran handles a large class of time-dependent, steady-state and eigenvalue problems in general two-dimensional regions.

The versatility of this software product makes it ideal for problems in areas such as elasticity, diffusion, heat conduction, potential energy and fluid high-level language that uses logical, natural statements in problem definition.

Protran statements are simple and solution-oriented, allowing users to perform computations and analyses with ease. Help files provide quick on-line reference, and Protran systems feature automatic diagnostic error checking. PDE/Protran is compatible with DEC System 10/20 and VAX computer systems. *Booth 1004.*

Talaris Systems, Inc., a vendor of laser-printer software and hardware, is

■ CONTINUED ON NEXT PAGE



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Configuration Control: CCC manages development and maintenance. It supports

management reporting, emergency maintenance, parallel development, and system builds on demand, with ease... **complete control of all processes.**

Product Integration: CCC is an integrated system. Other vendors require multiple products to perform only a subset of the functions that CCC handles.

CCC is a Proven Product: Over 1,500 Softool products are installed worldwide. CCC is supported on DEC VAX (VMS and ULTRIX); on IBM MVS/SP, MVS/XA, and VM/CMS; and is available for DG MV, Gould, Honeywell 6000 series, and Sun Microsystems computers.



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CIRCLE READER SERVICE NUMBER 90

E X T R A

■ CONTINUED FROM PAGE 37
scheduled to unveil a six page/min, 300 dot/in. laser printer.

Called the Talaris 610, the laser printer comes with 12 standard read-only memory fonts and offers emulation modes to provide compatibility with a wide range of software. The printer's native controller language, ANSI 3.64, offers flexibility for printing typeset-quality text and graphics.

Talaris also announced a chemical structures font that allows users to build chemical equations using standard word processing software packages, such as MASS-11 from Microsystems Engineering Corp. Talaris Systems combines advanced laser printers with a library of fonts, software, service and support to provide complete text and graphics hardcopy output systems.

Talaris extends the functionality of

its fully compatible family of full-page, bit-map printers by providing the software to easily manipulate fonts, text and graphics. *Booth 1800.*

Simpact Associates, Inc., the first licensed VAXBI options vendor, will exhibit bundled hardware-software communications interface products for the VAXBI machines.

All of these products use Simpact's multiport ICP1632 programmable front-end communications processor. Each product includes host-resident user interface, interprocessor driver routines, the board-resident driver routine and applications protocol software.

The protocols include Switched Virtual Circuit X.25, High-Level Data Link Control (HDLC) Bit-Oriented Link Access Procedure, Advanced Data Communications Control Procedure

(ADCCP) HDLC, and ADCCP Normal Response Mode.

Synchronous or asynchronous operations are supported at data throughput rates ranging from multiple low-speed ports to a single port at T1. Electrical protocol support includes V.35, Military Communication System Technical Standards-188-114 balanced and unbalanced, RS-232, RS-422 and RS-423. *Booth 1121.*

Kinetic Systems Corp. will exhibit the 8040 Concept, a powerful data acquisition and control system offering an economical alternative for applications requiring large system performance. Operating under MicroVMS, it interfaces DEC's Microvax II computer — with 32-bit VAX performance — to a standard Computer Automated Measurement and Control (CAMAC), IEEE-588 system via a dedicated Q-bus adapt-

er/controller.

The 8040 Concept is a complete process automation system. Users can choose from Kinetic Systems' wide range of CAMAC process interface modules, which includes a line of modular transient recorders, as well as crates and accessories.

Direct Memory Access to process interface modules is optional. This system handles processor-intensive, I/O intensive and real-time tasks and fully supports Kinetic Systems' Process Control/Data Base System software.

Both pedestal and rack-mounted versions of the 8040 Concept are available. *Booth 1504.*

Prestige PC, from **K&H Project Systems, Inc.**, is a management productivity tool with upload/download capability to the entire range of K&H products on VAX computers.

The system has a highly visual user interface incorporating colorful full screen operation with pop-up menus. It has been configured around a relational data base to facilitate integration with other software such as spreadsheet, accounting and other popular packages that accept Software Development Facility, IBM's Data Interchange Format or free-formats data transfer.

Prestige PC is currently under beta test at several companies in the U.S. and the UK. It will be formally released in January. *Booth 1037.*

Illinois Computer Cable will introduce fiber-optic cable to its list of DEC-compatible cables. The assemblies are terminated with standard SMA-style 906 series connectors.

Two separate styles are available, the VS100-VAX workstation cable and the CPU-to-terminal cable.

Some of the advantages of fiber-optic cable are reduced line loss, immunity from electromagnetic interference and radio frequency interference, light weight and low cost.

The cable is capable of running up to 1,000 meters. Fiber-optic cables are available immediately. *Booth 1829.*

GSI Transcomm, a Digital Cooperative Marketing Partner, will unveil its telemarketing expert system, **Telestream**. Developed in conjunction with Carnegie Group, Inc., **Telestream** was designed to counsel telemarketing employees during sales encounters.

Telestream is composed of mini-expert systems, representing managers from various company departments such as sales, inventory, purchasing and promotions, all interacting simultaneously via a special process known as "blackboarding."

Ultimately, **Telestream** can reportedly increase sales order profit margins and improve an organization's overall sales effectiveness.

GSI Transcomm will be conducting demonstrations of **Telestream**, along with its other **TOLAS** distribution and financial management application products during the show. *Booth 2143.*

Cosmic announces the availability of the **Plaid** computer-aided design (CAD) program. **Plaid** is a three-dimensional CAD system for interactively constructing and displaying sets of highly complex geometric models.

Polygons are constructed explicitly by coordinates or graphically with terminal cross-hairs or a digitizer. Solid models are constructed by combining or rotating the polygons.

■ CONTINUED ON PAGE 42

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A DEC compatible should not just be "more of the same"; it should be better. Not only better than other compatibles, but better than the original.

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The 3220 keyboard provides full functional compatibility plus a number of user enhancements. You get keystroke compatible, multilingual setup modes, seven additional keys, 22 dynamically allocated function keys, 256 bytes of non-volatile memory, an escape key where it belongs, and local programmability.

The packaging for the ADDS 3220 is an improvement in form as well as function. But this package gives you more than good looks. A conveniently angled legend strip, a tilt and swivel screen and thoughtful placement of controls, let you be more comfortable with the 3220.

Talk about DEC compatibility. The 3220 is fully compatible with the DEC VT220*, VT100* and VT52*, as well as ANSI X3.64.

The ADDS 3220—making compatibility more than just the same old thing.

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If you're looking for ASCII display terminals, ask about the ADDS 2020. It will raise your expectations about all terminals.

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EMC just gave the most advanced superminis the most advanced supermemory.

EMC announces an extraordinary leap forward in memory board technology for the VAX™ 8650 and 8600 superminicomputers.

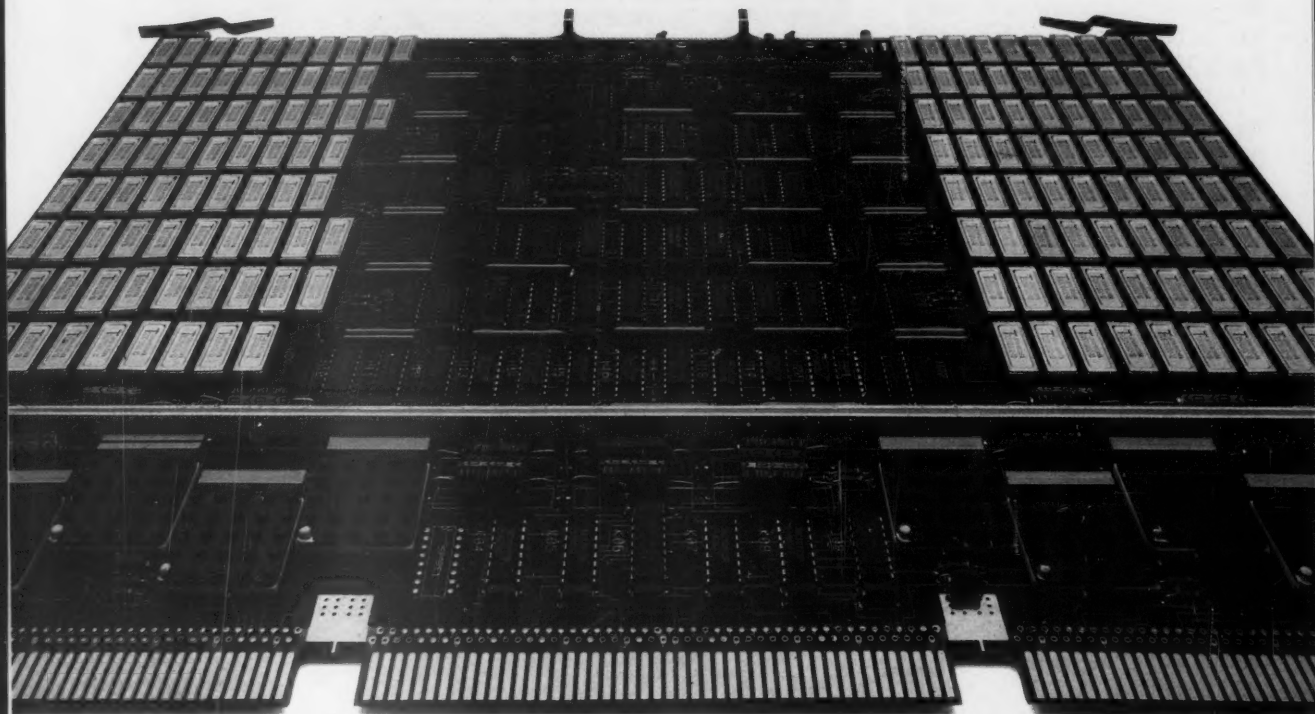
Supermemory: The first commercially available memory boards to utilize high-density Megabit chip technology.

No longer does your VAX system have to be limited by DEC's 68MB memory capacity.

Now you can give it as much memory as your current and future applications require—from 20MB all the way up to 128MB.

And do it with the most reliable memory ever manufactured.

For the first time, you can give your VAX system enough speed and performance to rival most mainframes.



Our 16MB supermemory design takes half the space of DEC™ add-in memory boards.

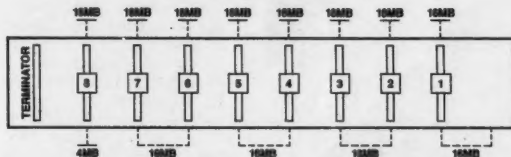
One of the big differences between EMC's new 16MB supermemory and DEC's 16MB memory is obvious at a glance.

DEC's board is twice as fat as ours.

That's because it's actually a cumbersome multiple board assembly.

What's more, DEC uses older 256K RAM technology and surface-mounted devices that require over

Each EMC 16MB supermemory board takes up only one slot.
Maximum capacity 128MB.



Each DEC 16MB memory board takes up two slots.
Maximum capacity 68MB.

11,000 solder points. That's nearly *five times* as many board connections as you'll find on our new supermemory.

As a result, DEC's multi-layered 16MB board takes up two full slots. While EMC's new 16MB supermemory board occupies just one.

By making full use of every available memory slot, our new supermemory virtually *doubles* your VAX system's main memory capacity.

And you'll protect your investment with EMC memory through generous trade-up credits. If you start with our 4MB cards and in the future want to upgrade to higher capacities, you never lose a cent of your initial investment.

You can configure our supermemory with any combination of EMC or DEC 4MB or 16MB memory boards into either an 8650 or 8600.

All, we might add, without affecting your DEC maintenance agreement in any way.

Super reliability plus the industry's only unconditional lifetime warranty.

Our new supermemory's greater density of RAM delivers the *highest reliability per bit or byte ever offered* by any manufacturer.

Every single EMC supermemory board undergoes a rigorous 100-hour test and burn-in procedure. Including 24 straight hours of CPU qualification under online conditions in our own VAX 8600 superminicomputer.

Because EMC memory boards are so reliable, there are *no maintenance charges* of any kind.

While with a DEC memory board, your maintenance charges over five years would amount to a stiff \$24,000 per card.

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E X T R A

■ CONTINUED FROM PAGE 38

Plaid builds complex assemblies by manipulating these basic objects. The user may view the assemblies from arbitrary viewpoints both in wire-frame and hidden-line renderings, with or without perspective. Booth 826.

American Computer Hardware Corp. will introduce the CIE 3000 nonimpact printer. This 30 page/min, 300 dot/in. printer has a 150,000 sheet/

month duty cycle, low cost/page printed and high mean time between failures. The CIE 3000 has two alternate-use input trays as well as a straight-through and a sequencing out-feed stacker.

The CIE 3000 can handle letter- or legal-size paper and comes with a Dataproducts Corp. or Centronics Data Computer Corp. parallel interface. American Computer Hardware has a RS-232C interface available as an option. Booth 1104.

ADAC Corp. will introduce the ADAC 4000, offering complete signal conditioning functions in a compact, economical enclosure.

The ADAC 4000 was designed to provide a complete interface between real-world signals and a computer-based measurement and control system.

Field wiring is directly connected to screw-mounted terminations on the enclosure. Each ADAC 4000 can accom-

modate up to eight I/O conditioning modules, according to the vendor.

With more than 30 models, these plug-in modules can operate with a variety of signals, including 120/240V, 24/48V DC, contact closures, interrupt event lines, high-current DC outputs, 1mV to 10V analog inputs, 4-mA to 20-mA current loop I/O, parallel transistor to transistor logic I/O ports and other resistive bridge elements. Booth 418.

Nemonix, Inc. will unveil a 16M-byte memory board designed for the VAX 8600 and the VAX 8650.

The Nemonix board is reported to be a technological breakthrough, both in price and performance.

The Nemonix 16M-byte board is the only memory board to come with a stand-alone program for self-diagnostics and is guaranteed for the life of the VAX 8600 and VAX 8650. Booth 612.



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*Please consult with your participating TI reseller for specific emulation characteristics.

A 16M-byte — 1M-bit dynamic random-access memory (RAM) — memory card that is fully compatible with DEC's VAX 8600 and 8650 will be unveiled by **National Semiconductor Corp.** The NS865-16 occupies a single card slot, allowing the systems to be expanded up to 128M bytes. National Semiconductor is introducing on-board diagnostics, which allow service personnel to quickly verify the status of each memory board without loading system diagnostics. The on-board diagnostics will provide the location of any failing RAM via a LED display. Spare RAM on the board can be used to immediately repair the memory board. Booth 118.

Habitat TM, **ESCA Corp.**'s real-time software environment, now is said to make the development of engineering applications even faster. Version 2.2 Habitat TM supports programming in Pascal in addition to Fortran and VAX-11 Macro.

Other enhancements reportedly improve console performance while giving application developers a more versatile user interface. Habitat TM now supports full-color displays on the IBM Personal Computer using ESCA's PC17 TM emulation software package. Booth 1746.

Digital Data Systems, Inc. will be showing its newly introduced 4M-byte and 16M-byte memory boards, which are fully compatible with the VAX 8600 and 8650. The 16M-byte board uses 1M-bit chips and occupies only one memory slot in the system. It allows for an increase in capacity up to 128M bytes in the VAX 8600 and 8650 computers. The 4M-byte board, which incorporates 256K-byte chips, can be used with any combination of 4M-byte or 16M-byte boards. Booth 1524.

Dataram Corp. will highlight its 20 years of DEC memory expertise by displaying a full spectrum of DEC memory technology. Dataram's fully compatible PDP-11/83 and 11/84 PMI bus memory will be introduced. The quad-size DR-283 memory board offers 1M byte or 2M bytes of data storage plus associated error correction control check information. Booth 1420.

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COMPATIBILITY FOR THE FUTURE

BY PETER COHEN

DEC is riding high on VAX VMS and will not dismount until well into the next decade. Expect a succession of new mid- and high-range VAXs, more capable and flexible network offerings, enhancements to the integrated office package and an assortment of terminals, printers and storage peripherals. During the next five years, not only will DEC move to bolster its advantage over its traditional minicomputer rivals, but DEC's sights are set squarely on IBM.

In the late 1970s and early 1980s, DEC was immersed in the development of the VAX VMS architecture while struggling with Ethernet networking. At the time, these were not the computer industry's most glamorous advances; in fact, a demand for the capabilities of a unified architecture was only barely evident. Today, users are vocally demanding compatibility, and DEC has a solid foundation in place. At least for the next five years, the VAX VMS architecture will serve as the central feature of the company's

product strategy.

Compatibility is the strength of the VAX VMS architecture. Compatibility facilitates communication within the user's organization, and it protects the user's investment in software. Now that it can deliver this capability, DEC is spending money to get the message to the marketplace. Not known as a marketing company, DEC is instead relying on building a better mousetrap to attract users' attention. With the world beating a path to its door for VAX VMS capability, DEC has every intention of offering as much of that product as it reasonably can for as long as it reasonably can.

The VAX VMS development effort was difficult and costly. DEC now intends to reap the benefits of that effort. Margins and profitability have already improved, and more gains are expected during the next several years. During the fiscal year ending June 28, DEC's gross margin improved 43.6%, already a significant gain over 1985's 38.9%, and the net margin swelled to 8.1% in 1986 from 6.7% in 1985. In 1983 and 1984, the company's research and development spending ran more than 11% of total revenue.

With the basic architecture now in place, the company can pull R&D expenses back into line with industry standards. The slew of products introduced over the last 18 months and those likely to be forthcoming over the next few years will capitalize on the R&D groundwork already laid. Changes will be incremental. Lower manufacturing costs will also bolster DEC's bottom line. The new processors are simpler and less expensive to manufacture.

No RISC. Do not expect DEC to adopt reduced instruction set computing (RISC) technology on a wide scale in the next few years. The company has experimented with RISC-based processors, but the performance relative to VAX has been unimpressive. In essence, any speed advantages offered by RISC do not outweigh the compatibility advantages offered by VAX VMS.

DEC may introduce a RISC-based processor if it is essential to meeting the requirements of a particular market. The company, for example, does offer a Unix operating system, along with VMS, to satisfy segments of the engineering and government markets. The RISC machine will, however, be an adjunct to the VAX VMS architecture. It is not likely to supplant it, a la the Spectrum series at Hewlett-Packard Co.

■ CONTINUED ON NEXT PAGE



ILLUSTRATION BY RALPH MASELLO

EXTRA

■ CONTINUED FROM PAGE 45

Microvax cluster. Look for DEC to introduce, within the next 18 months, cluster capability for its highly successful Microvax II. Like the rest of the VAX line, the system can already be networked via Ethernet, allowing one Microvax II to remotely access another. Clustering will enhance this capability. Clustered Microvax IIs will share resources and balance work loads in a fashion less apparent to the user.

The trick is for DEC to introduce the Microvax II cluster capability without cannibalizing its low-end VAXs, the 8200 and 8300. The Microvax II is on a significantly lower price/performance curve, and a user could theoretically cluster Microvax IIs and achieve performance equivalent to the more expensive 8200 and 8300.

To discourage this scenario, DEC will probably limit the data transmission speed on the Microvax II cluster. Using Ethernet, data transmission will be at 10M bit/sec., which is significantly slower than the Vaxcluster's 70M bit/sec. transmission speed. A user will not be able to configure the Microvax II into a high-speed cluster; the 8200 and 8300, however, can participate in full Vaxcluster performance.

The high end. A VAX larger than the 8800 is probable. DEC customers require more power. A processor exceeding the 8800's 10 to 12 million instructions per second (MIPS) may well be introduced within the next three to four years.

Even more horsepower could come later by adding processors or by expanding the dyadic 8800 to a triadic or quadradic system.

Of course, current users can already expand beyond the 8800 via a Vaxcluster; up to 16 VAXs can be configured in a single cluster. In fact, nearly all installed 8800s are configured in Vaxclusters.

But the requirements of the scientific/engineering community are not necessarily satisfied by a cluster. Processor-intensive scientific/engineering applications, such as finite element analysis, are often not easily fragmented among processors. In essence, only one processor can perform most of the work, even though that processor may be configured in a Vaxcluster. The performance is constrained by the capacity of the single largest VAX. To relieve that bottleneck, a high-end system exceeding the 8800 is required.

Expect DEC to phase out the two Unibus VAX processors, the 8600 and the 8650. The 8550 and 8700, incorporating the VAXBI I/O subsystem, have already been announced at the 6- to 7-MIPS performance range. A processor in the 4-MIPS range will probably be introduced shortly. Unveiled in late 1985, the 8600 and 8650 preceded the availability of VAXBI. Replacing the 8600 and 8650 presents no particular hardship for users of these two systems, though; a broad array of DEC (and non-DEC) Unibus peripherals are available. Besides the 8600s and 8650s, about 50,000 earlier VAXs use Unibus, and the company will continue to support this lucrative installed base.

The risk to DEC is that it will cling to VAX beyond its useful life — that the architecture will not keep up with users' requirements or competitors' offerings.

Office automation. Look for DEC to enhance its All-In-1 product. In particular, expect more department-specific functions and a better human interface for the product.

DEC has built a strong presence in departmental computing based on the compatibility and networking strengths of the VAX. Leveraging this strength, it has pushed its All-In-1 integrated office system to a leading market position. At year-end 1985, 3,600 All-In-1 systems were installed, accounting for more than 20% of the market.

DEC is already shipping at least two department-specific modules for All-In-1, which are sales and marketing applications and human resources applications. More of these are likely to appear as users look to push their office automation capability beyond word processing and electronic mail.

Holding action in printers. The objective of DEC's strategy in the printer market will be to hold onto its installed base. In line with its commitment to offer complete systems, the company will continue to roll out printers for systems from personal computers to the largest VAXs.

Specifically, look for a mid-range capacity (20 to 70 page/min) laser printer, which DEC may eventually package into a technical electronic publishing system. A low-end printer will also be offered with the forthcoming Vaxmate personal computer.

Bringing storage in-house. DEC will likely continue to reappropriate storage development and manufacturing to its own facilities, away from outside suppliers. The company's Colorado Springs operation is already shipping high-capacity drives (500M bytes or more), and more high-end, high-margin direct-access storage device products will be

forthcoming. Also, expect in-house-manufactured follow-ons to the HSC-50 and HSC-70 intelligent controllers.

Under this made-in-house strategy, DEC intends to retain more control over quality and pricing and earn higher profits on its storage products. The closely held VAXBI will bolster this effort; unlike the publicly available Unibus, VAXBI licensing will be limited to complementary, noncompetitive product vendors.

In tape storage, the appearance of another generation of the TK50 is probable. In the longer term, however, DEC is expected to introduce an IBM 3480-compatible tape cartridge that will begin to replace reel-to-reel tape backup devices.

At the low-end, the company will also be cutting down on its reliance on outsiders. Though outside suppliers will still provide most sub-100M-byte drives, look for DEC to develop and manufacture its own 5¼-in. 100M-byte or more drives for the Microvax II.

The terminal market. If DEC intends to hold its share of the terminal market, it needs a follow-on to the VT200 series. These terminals, introduced in late 1983, have already lost a large piece of the market to more aggressively priced and more capable compatibles.

Wyse Technology, Inc., CIE Terminals, Inc. and others offering bigger screens, more features and prices well below DEC's \$1,000 grabbed 30% of the VT200-compatible market in 1985.

DEC's response to this challenge is not yet clear. The company will always sell terminals, committed as it is to providing complete systems. It may not, however, choose to participate in a low-margin commodity market; it could simply cede market share.

Life after VAX. DEC will build on the VAX VMS foundation well into the 1990s, but then what? The risk to DEC is that it will cling to VAX beyond its useful life — that the architecture will not keep up with users' requirements or competitors' offerings.

The next-generation strategy will perhaps aim at making computers easier to use, and maybe DEC will develop radically improved man-to-machine interfaces, such as natural language programming, graphics, voice recognition and synthesis.

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INTERVIEWS

When a company's founder is still president after 30 years, it throws the traditional ideas about succession into confusion. There is at DEC, for example, no precedence for turning over the reins of leadership. And further, Ken Olsen is a robust, energetic and undaunted 60-year-old with no apparent thoughts about retirement. These are not shoes waiting to be filled. Olsen appears ready for another decade in his beamed and brick office in the Mill.

Nonetheless, big companies cannot avoid the scrutiny of analysts, media and shareholders who wonder out loud where the mantle of leadership will fall when the top man steps down.

In many ways, DEC is Olsen and Olsen is DEC. The next president will step into an enormous void — not an altogether enviable position. It is heresy at DEC to suggest an outsider could be brought in to run the show.

Three men — Jack, Jack and Win — are strategically positioned to replace Olsen whenever the time comes. John Smith, John Shields and Winston Hindle Jr., all DEC career men in charge of key facets of the

WHO'S ON DECK?

company, were named senior vice-presidents in June.

Olsen claims that the promotions to the newly created positions were simply a long overdue recognition of contributions to DEC. He refuses to participate in any "name the successor" competition. For their parts, Shields, 47, Smith, 51, and Hindle, 55, deny that succession is an active issue. They agree that naming a specific successor now would only put undue pressure on that person. Hindle perhaps speaks for the entire company when he says, "I've never quite thought about it, because Ken has always seemed like he's going to be here forever."

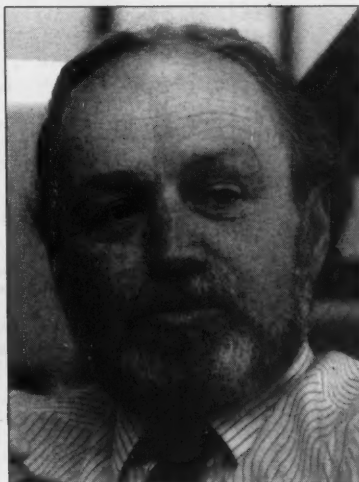
The early speculation puts Shields in the lead. The youngest of the group, Shields has spent 25 years with DEC and is in charge of all its sales, service and international organization, a vast area that employs nearly half of DEC's population. Hindle is in charge of corporate operations while Smith handles all of engineering, manufacturing and product marketing. A possible dark horse: Bob Hughes, DEC's dynamic marketing vice-president.

In separate interviews, Senior Editor Glenn Rifkin spoke with Shields, Smith and Hindle about their roles at DEC, the direction of the company and their feelings about succeeding Ken Olsen.



JACK SMITH

PAGE 48



JACK SHIELDS

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WIN HINDLE

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EXTRA

JACK SMITH

The affable and candid Jack Smith had the unenviable task of replacing Gordon Bell as head of DEC's engineering group when the legendary Bell left in 1983.

Smith points out, though, that it was a natural transition, since he and Bell had been working side by side coordinating engineering and manufacturing for several years. Smith, DEC's 12th employee, is now senior vice-president of manufacturing, engineering and marketing.



What is life after VAX?

Smith: VAX is pervasive. VAX is going to be around for an awful long time. When I say VAX, I'm also saying VMS. I'd just like to get that point across. It's the software that actually runs the system. And there is such an installed base out there, and VAX and VMS is so pervasive that VAX and VMS is going to go well into the 1990s.

Now there may be other market opportunities that will require a different approach to computing other than the VAX VMS architecture, and we have proponents out there every single day, banging away at that. And indeed, we're constantly doing advanced devel-

opment in those areas.

What happens to the PDP line? Is that eventually going to disappear?

Smith: We're going to continue to support it. We're still selling that thing. Last year, we sold close to one billion dollars, believe it or not, in PDP-11s. We just recently introduced our newest model.

If you are still introducing models, you are doing more than supporting it. You are still developing it. Is that contrary to the slogan, "One company, one product, one strategy"?

Smith: Not really. Even today when we talk about new computing structures, such as reduced instruction set computing (RISC), of course we are doing heavy advanced development work in that area. No matter what we develop, be it a general-purpose computing architecture such as VAX and VMS, be it RISC, be it special computing machines based on parallel processing or whatever it is, it's going to play together. We're not going to change that.

So if you're a customer, and you've invested 15 years in VAX VMS as your general computing environment, and, for some reason or other, you come up with an idea that requires a different architectural approach such as RISC or parallel processing, if we feel that's good for you, and that's the right way for you to do your computing, we will provide that to you.

But you can rest assured when you plug it in to your current computing

environment, it will play.

What about the sales force that is still trying to push PDP-11s that runs into an opportunity where a VAX solution might be better. Do you tell them to push VAX?

Smith: We don't do that. That's the wrong approach. You have to sell to the customers what they really need from their standpoint of running a business. If you don't do that, in the long term, you're going to screw yourself. There's just no doubt about it. The saddest thing, at least in our life, is to walk into a factory, walk into an office and see a piece of our equipment not being used. That to me is just devastating. It's devastating to us, and it's also devastating to people that we're trying to convince that our style of computing is better.

So what we try to do with the customers is work with the customers to really decide what is best for them. For some of our customers, PDP-11 is best, not VAX.

What would be an example of that?

Smith: Let's say you're running your business and have an installed base of PDP-11s worth \$4, \$5, \$6 million. They're all sitting there pumping away getting the job done. Could VAX do it better? Maybe. But do you have to get it done better? Maybe you don't. You're getting the work done. Do you have to get the work done three times as fast? Maybe not. You have people trained, you have a nice stock of spare parts, you know you can get your job done for the next 10 years with the same style of computing. Why do you need this new box?

There are other situations where you walk in and talk to a customer, and you say to yourself, "Boy, this guy's going to get blindsided. He's going to run out of capacity and is not going to be able to do the degree of computing that he's going to have to get done five years from now." That's when you have to start changing them over.

The classical situation is our 36-bit customers with a PDP-10. When we looked at that, we just said, "That whole area is just heading in the wrong direction. In five or six or seven years from now, those folks are going to be in trouble, and they're going to top out. We'd better bite the bullet, and we'd better start convincing them that that is the situation, and they should switch over to VAX."

Do you foresee that happening with VAX?

Smith: It has to happen to VAX someday, right? The question you ask is when, if ever, you think that's going to happen. And as far out as we can see, we can't see that changing dramatically by any stretch of the imagination through the '90s.

Do you see breakthrough research coming through on parallel processing or some dynamic new chip that throws the industry completely around and everything that you have done to this point just suddenly becomes obsolete?

Smith: We don't foresee that happening. There's all kinds of hot boxes being developed everywhere. We're not in the business of selling hot boxes. We're in the business of selling the computing environment. And every week, somewhere, someone's going to be coming out with a new concept of computers.

When we feel that that new concept of computing will do something better than our approach, we will go out and

we certainly will develop it. I can't see any area, at this point in time, of computing that we feel is going to be significant that we're not doing the biggest development in. We're just not going to get blindsided.

What about the issue of standards in manufacturing? Should a user such as General Motors Corp. be creating standards like Manufacturing Automation Protocol (MAP)?

Smith: General Motors is in the car business; they understand it well. They should understand that that's what they understand. The [computer] industry it-

The saddest thing, at least in our life, is to walk into a factory or an office and see a piece of our equipment not being used.

self will take care of developing the standards that it thinks are necessary in order to do what's right for the customer.

When a customer tries to develop standards around areas that they may not quite understand as well as they should, they may be doing the industry and themselves a disservice, simply from the standpoint that it creates tremendous turmoil.

Whenever you start talking about potential standards, a lot of development comes to a screeching halt. Everybody takes a step back and says, "Wait a second. Let's find out what the standard's going to be." And development starts to slow down. That's what's happening to some degree in this particular situation. Development's not going as quickly as we might like to see it go, simply because there's turmoil relative to standards.

Are you actively working against MAP, therefore?

Smith: No, because there are too many people that have begun embracing MAP.

So you are reluctantly going along?

Smith: Of course. You must. The same thing happened with Unix. Unix is being embraced. We have to go along with it. You can't ignore a large following in our industry, just like you can't ignore a large following around MAP. Now do we think it's the best approach to the problem? Absolutely not.

Will you offer an alternative?

Smith: We will continue to pursue our approach to what we think is best in the factory. Whatever we do is going to plug and play. So if people want MAP, and that's what they think is best for them, then we'll give them MAP. If they grace our particular approach, then we'll offer that also. We'll let the customer decide. But we'll also, as much as possible, be assured that if it's necessary for those two things to plug and play, which in some cases it may not be necessary, we'll do the best we can to make it plug and play.

So you are saying that you are developing your own version of factory automation that does not fly with MAP?

EXTRA

Smith: We have been for the last 10 years.

That works against the concept of a standard, does it not?

Smith: Well, sure. Can GM set the standard? The only standards — if you look at history — that have survived the ravages of time are those developed by the industry itself, not standards developed by large, significant companies.

For all the connectivity that DEC is being praised for now, the company has been reluctant in several key areas to come into line with what seem like clear industry standards, such as the IBM Personal Computer or Token-Ring for local-area networking.

Smith: There's always different approaches to how you want to supply computing to the customer. And the one you bring up is a good one, Token-Ring vs. Ethernet. We believe that in the long term you must do what's best for the customer, and if you don't do that, eventually you're going to get into trouble as we did with the DEC-10.

There are certain situations where we feel our approach is right from the standpoint of the customer, and we will not give that up. Now, the industry is still dominated to a large extent in size by IBM, but folks have to begin to realize that we're pretty significant in terms of what we do, and size isn't a total criterion. So we feel that we should be in a position now to influence the industry in some of these areas.

Will people be using Token-Ring? You bet your life. Why are they going to be using it? IBM. Will they be using Token-Ring because it gives them a better solution? My biased view is "no." Does that mean that we should then shift over to Token-Ring? I don't think so. We'll stay with our convictions that our Ethernet is a better solution, and we'll let the marketplace decide.

But you will provide connections between them. Is that your philosophy?
Smith: We do it now for all practical purposes. We connect better with IBM than IBM connects with IBM.

IBM seems to be realizing its mistakes in the middle range and is setting about to correct them. Does it concern you that with its resources it will sooner or later catch you and dominate your current markets?

Smith: On one level, you have to feel good about that. Maybe IBM will legitimize us. On the other level, they're competitors, they're good and they're big. But one has to realize — you don't do what we did overnight. It took us 15 years to do what we did. And IBM took a different approach. How long is it going to take for them, if they should so choose? And some people feel today they have made this decision. I don't know. I know how long it took us. I know the level of discipline it took for us to do what we wanted to do. And for them to convert, if they should so decide to convert, it's going to be extremely difficult.

Nonetheless, if anybody can do it, it's IBM. It has the money and the resources. There must be great concern, not just minor concern for a company like DEC whose very foundation is built on this market.

Smith: That's one thing one has to think about. I mean, money is important. The other thing that one has to think about is how difficult is it to change a technical community? I would guess there are still proponents within IBM, within the

technical community, walking around saying, "What's the problem? We've had the solution for 30 years, and we've got these little irritants called Digital down here, this little \$7 billion company. What makes them so smart?"

And so it's not only having the monetary resources, per se, to pull this thing off; it's being able to convince a fairly large technical community that that's the right thing to do. And in my experience, that is not easy to do. I would not like to have that problem.

How do you feel about being considered a potential successor to Ken Olsen?

Smith: This may be hard to believe, but it's true: We don't think much about that. The recent publicity we've been getting about that has gotten us to think more about it. But I haven't personally

given it a lot of thought. Ken is 60 years old. He's going to be around for a while. We don't have any mandatory retirement age. I go to most board meetings, and it's never been discussed at the board meetings.

But now that you have given it thought, is it a position you aspire to?

Smith: It's certainly something that anybody in this position would aspire to. What is the next logical step? If not here then somewhere else. You push yourself as far as you think your abilities can carry you. I believe that my abilities will carry me farther in some role, maybe not necessarily in this industry. I've always aspired to be No. 1 in an operation. It doesn't necessarily have to be this industry or this size company.

If you were named the successor five

years from now, would you do anything dramatically differently?

Smith: It all depends on what you mean by different. The basic values of this company will never change. It's not only Ken Olsen; it's ingrained in the organization. Of course, Ken contributed significantly to it, but the organization contributed significantly to itself in building these values throughout the years. I think any change would be very difficult and certainly undesirable.

If you had to choose, would you pick yourself?

Smith: That's a difficult question to answer. We're five or six years away, maybe 10 years away. And a lot can happen in the course of five or six years. We continue to learn and to grow. I'm sure that when the time comes, it will be fairly obvious.

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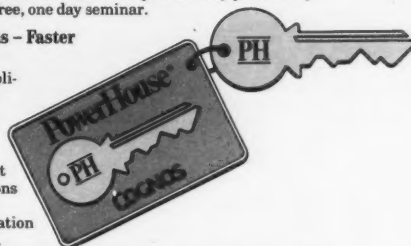
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COGNOS

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geting. But Kathy looked beyond circulation audits to find these people. *"Computerworld has a high verified pass-along audience that's very loyal. When you consider this, the number of targeted people we can reach every week is over 300,000."*

No other publication can deliver that kind of audience, and that is why, says Kathy. *"More than half the advertising we have done has been in Computerworld."*

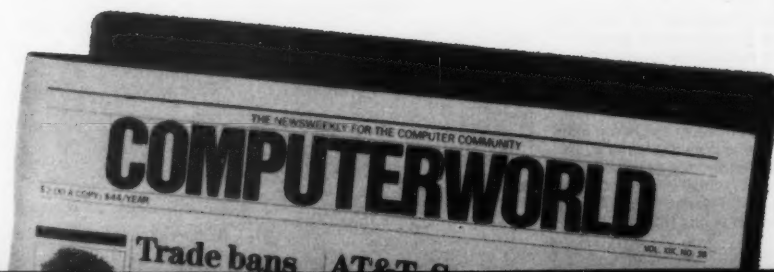
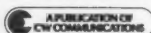
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EXTRA

JACK SHIELDS

Diminutive in stature but a powerful presence at DEC, Jack Shields holds responsibility for sales, services and international. He is also a member of DEC's executive committee and chairman of its marketing and sales strategy committee. A graduate of Harvard Business School's Program for Management Development, Shields has risen steadily through the ranks since he joined DEC at age 22.



You've been with DEC for 25 years. How did you reach your current level in the company?

Shields: I started in the engineering area, and at that time, we had two computers installed. The third one went to MIT, and I installed that and began to have contact with customers. And we discovered we needed a service organization, so I started the service organization for Digital, and I managed it and built it. Of course, in those days, there really wasn't anything like software services — it was a hardware service.

In the early '70s, we had a training organization, which was basically there for both internal and external training for hardware and software, and I took responsibility for the training organization.

We had a software services organization building up, and I took responsibility for that in 1978 and put it under a title called "Customer Services." In 1981, I took responsibility for the sales and international organization, and I went to Europe and reorganized our European operation.

The structure seemed very loose early on. Was that a problem?

Shields: Well, it was loose, but you didn't have any responsibility very long if you didn't do it. And some of the things we did in service are innovative and different and, in fact, are being recognized today as an appropriate way to run a service organization. For example, we decided to make a profit in service from the outset. That was absolutely heretical. IBM didn't do that; they didn't make a profit in service.

Why did you decide to make a profit from service?

Shields: The customers we sold to were generally scientists or engineers who were self-sufficient; they didn't want to pay for something they didn't need. And so you couldn't charge a price that essentially supported a service organization because your customers didn't want to pay the price for it. They were more interested in paying for what they needed.

How do you measure your success with service?

Shields: We've been running opinion surveys for close to 15 years now. We got more than 200,000 returns last year. We measure our managers on it; we

We decided to make a profit in service from the outset. That was absolutely heretical. IBM didn't do that; they didn't make a profit in service.

promote them based on it. We have service excellence awards.

Apparently, despite these boom times for DEC, there remains political infighting about the direction of sales and marketing.

Shields: This is a huge organization, so I'm sure that somewhere along the line there are people with opinions who think you could do things differently organizationally. And like all organizations, there tends to be benefits involved and risks around how you organize. We had a lot of argument over how to organize four or five years ago. We had a sales organization that was organized by market groups in the company, and we chose to change that. We've changed it in Europe.

So for people who argue philosophically that we should do something different, it may be a nice, but academic, discussion. Our accomplishments are a matter of record.

It's great to discuss different organizational approaches, but we want to organize around our customers. Our customers want to see a Digital Equipment Corp. that can solve their problems in different applications and dif-

ferent departments, in fact, across multiple geographies. We've organized that way, they seem to like it and we're having success.

Again, how you mix and match skill sets and training is another question. We organized our company in a multi-dimensional approach. We have a dimension along applications, on industries, along geographies, around products and along channels.

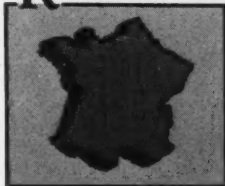
At any moment, I could show you the company along any one of those dimensions. It's healthy, and we can tell you whether we do or we don't make money this way, or we are or we aren't successful that way. Whenever you have that sort of thing, there might be a person or a group that has a particular view that one dimension is better than another. That's normal. There's no big deal.

It's not causing delays in sales and marketing of any particular products?

Shields: Oh, hell no. The problem with anything that's as complicated as this is that there are interdependencies, and one dimension is always dependent on

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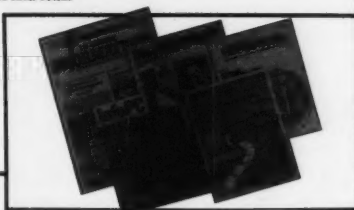
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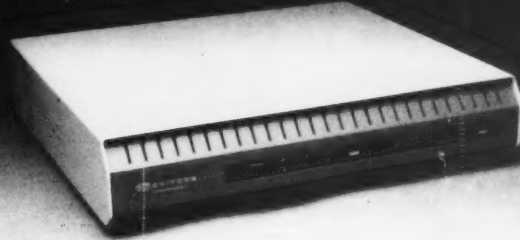
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■ CONTINUED FROM PAGE 51
another. So people's view of the world is different depending on where they sit.

This company is better organized and more together on more issues than we've ever been, even when we were very small. We are a company that manages through discussion, conflict and debate of issues; and that style, if you will, does get people to argue a different perspective. We want that.

As you look at 1986 and beyond, what are the critical issues for this company?

Shields: We've now got a direct selling effort. And my No. 1 goal is customer satisfaction. I believe that if we have a loyal, satisfied customer base and continue to make that our No. 1 priority, then it's going to be very, very difficult for anybody to take those accounts away from us. That's a strategy, a plan, a dedication, a fanatic commitment, if you will. We're zealots on that issue.

What key changes have you made in the past four or five years?

Shields: We've linked our manufacturing and our selling organization with tremendous results. Our inventories are lower than three years ago. We've introduced a whole new set of products over the last 14 months.

We're expanding our sales organization; we're delegating more responsibility to them.

We are learning how to sell better at higher levels in the company rather than at people who need a solution at a technical level.

A salaried sales force has gained a lot of attention. Are any of the concerns justified?
Shields: It's up to us to make sure that we don't have people who have a laissez-faire attitude about sales, and that's the criticism.

It isn't that we don't have products that we want to move, but we don't build inventory and then tell our salesmen to move it.

Are you seeing defections from IBM to your products, or are you getting mainly new accounts?

Shields: Clearly, there are defections from IBM. We're winning business against everyone, and the biggest potential for us to get market share is against IBM. I don't know what IBM's performance will be this year, but I can read the papers, and they have negative growth in the U.S. And the only growth they had last quarter was a result of currency. And we're growing.

Now, if we're growing and everyone else is flat to negative, it's clear we're winning market share; and if they are the large holder of the market, then it's pretty obvious that some of it must be coming at their expense.

And again, there's no lack of

respect for IBM; it's just that their approach is different, and for them to adapt to or adopt our approach is not easy.

But when you look at a 10-year time frame, a company with IBM's resources ought to be able to correct its errors.

Can you gain enough momentum to hold them off from your strengths for that long or even catch up to them in size?

Shields: Oh, no. It's not a question of catching up to them.

They'll still be No. 1 in 10 years. But what I'm trying to do is to point out that this company a few years ago was 50 times our size, and today is seven, and maybe next year would be less than that. And in 10 years, perhaps, we're talking factors of two or less, so that's a completely different situation of dominance than the levels that existed before.

Ken Olsen said that success, especially on this level, scares

him a lot, probably more than anything else. What scares you the most about the good times that DEC is going through right now?

Shields: Complacency is of concern. And I doubt we will. It's not in our nature. That's the fear.

The other potential problem is the antithesis of humility; it's called arrogance. Perhaps Ken would present it in a way differently than myself. He would say that you had to be humble,

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and I would say we have to watch out that we don't become arrogant. That has to do with my concern of how we deal with customers and customer satisfaction. You don't refuse to do something for a customer.

Figure out how to compete. If we can keep that attitude, we'll be all right.

How do you avoid getting complacent if you approach IBM-like proportions over the

next decade?

Shields: The fact that you're aware and worried about it is a major step forward. The concern would be what happens when all of the people who have been through this for years are gone, and you get that second generation of managers.

What happens when all of the people who were part of the whole building and fighting and growth of the company are all gone?

They don't remember the lessons from the beginning.

Shields: No, because you have to experience those things; and unfortunately, as bright as people are, there's nothing that substitutes for experience.

How do you feel about the thought of Ken Olsen retiring and you as a candidate to fill his spot?

Shields: Well, of course, Ken is Ken. I think when everything is over, there's a good likelihood

he'll be called the industrialist of the century.

That's high praise.

Shields: Look at the data. This company's grown faster than any other company in history, with the exception of Honda Motor Co. Secondly, the only company that's grown larger by the founder is Honda Motor Co., and Mr. Honda has retired, and the size of Honda Motor Co. on his retirement was somewhere between \$9 million

and \$10 billion.

It's not likely that Ken will retire before our company reaches that size if one just takes the normal growth.

And so here's a company that will have achieved its size in one of the most competitive areas in a global economy where competition is, in fact, on an extensive, multinational basis and is not in any way related to the discovery of major natural resources.

Nor was it accomplished in a moment when one could get empires together through things that happened with oil and banks. And it was done in an environment with a tremendous amount of legislation and other factors, which are basically there to restrict big business.

What impact would you or Win Hindle or Jack Smith make in light of that?

Shields: To say that a company won't be different after somebody like that leaves doesn't make much sense. Of course, things will be different.

Will they be a lot different? I doubt it, because companies tend to take on a character, tend to take on an existence and a culture that is very much reflected by the leaders of that company.

So, in a sense, it will be different, but in a sense, it won't be different. A lot of the fundamentals will be the same.

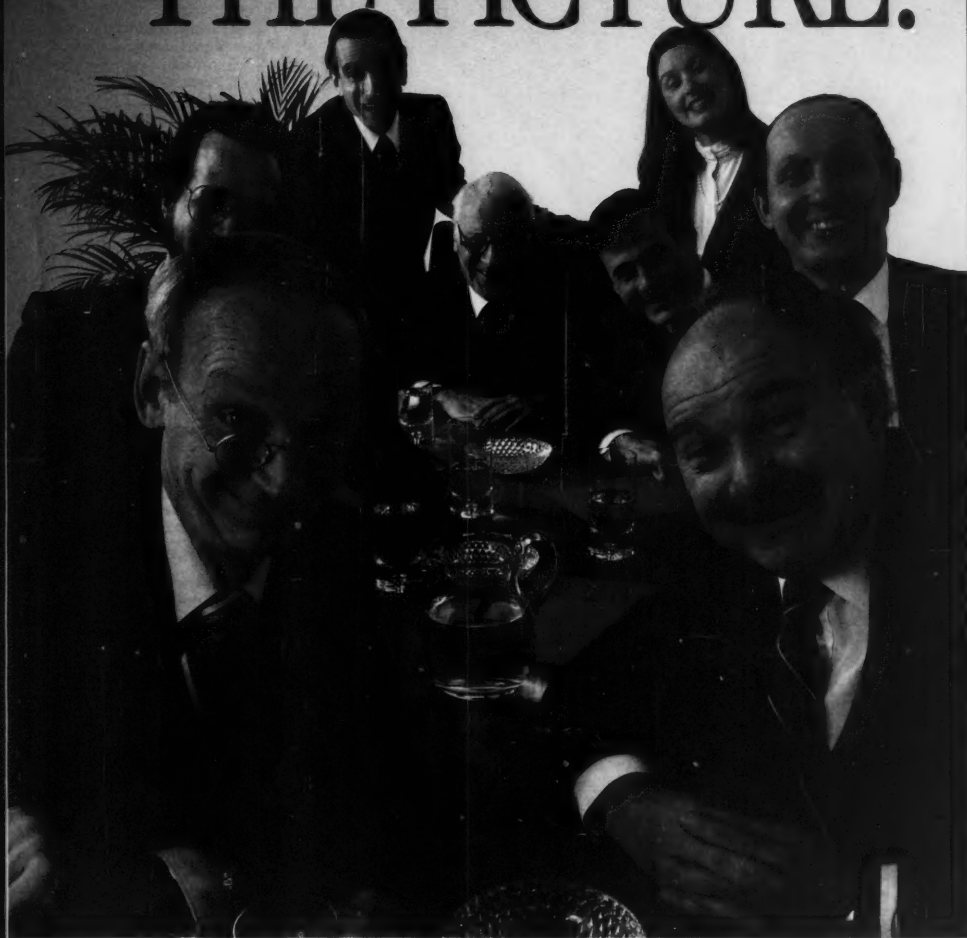
I would suggest that of the three people that you mentioned, there wouldn't be a heck of a lot different in terms of their philosophy and their views. Of course, there will be differences. There's no doubt that different people bring different approaches, different style, a different slant.

As to who will be the successor, I don't know. That's a question that Ken does, and probably should, keep to himself. He certainly doesn't talk with us about it, and I keep my options open as I'm sure he does. I've got plenty of time.

Are you the right man for the job?

Shields: Anybody who's been here for 25 years and who has grown and built and is still here and working hard would have some motivation to perhaps have the responsibility for all of it. You get any executive who's been out in the world working in a company for a number of years and he sees that as another step in his career.

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WIN HINDLE

Win Hindle, an MIT graduate, joined DEC in 1962 as assistant to Ken Olsen. Hindle has served extensive tenures in both administrative and product line positions, giving him a unique view of DEC. Unlike Jack Shields and Jack Smith, Hindle does not come from an engineering background. A member of the office of the president and co-chairman of the management committee, Hindle became vice-president of corporate operations in 1978.



How did your career develop at DEC?
Hindle: In 1964, I was one of the people who helped Ken set up the product line structure of the company. I became one of the product line managers. I worked myself into the product line organization and out of a staff assistant's job.

You stepped out of an administrative role, and now you are back?

Hindle: Yes, and I should describe corporate operations, since operations in many companies is considered to be manufacturing or day-to-day operations. That's not at all what I do.

I'm in charge of seven corporate functions including quality, purchasing, information systems, planning, staff, public relations and marketing communications.

You keep the ship on a straight course.

Hindle: We try. And again, we are a distributed company. Each one of those functions [above] has a corporate group. We also have resources such as information systems out in the organization. We probably have 300 people in corporate information systems, but there are 10 times that many out serving the sales function and the field service function. Our job as a corporate office is to provide the standards, the quality control and the auditing function the rest of the company will use.

Often when a company gets to this size, there is some sense that in the old days it was fun, when there were only 400 people who knew each other by their first names. Is it still fun?

Hindle: I can't remember a more exciting time at Digital than now. We went through a bit of a trough four years ago when we changed our organizational structure, and things didn't go well for us for a period of a couple of years. We got behind in our product developments, and we didn't bring out enough new products. But that's all changed. And over the last two years our products are coming out on time. We have a full-scale VAX program in which we've replaced all the products in the last year and a half. I couldn't imagine being more excited about the company than I am today.

If I had asked you that four years ago, you probably would have answered differently.

Hindle: It might have been a little tougher four years ago to have said that confidently. The world was beating on us, and we were having to read lots of articles in magazines and papers that Digital was falling apart, and Ken Olsen couldn't lead the company anymore.

You have been with the company 24

years. What has kept you with DEC all this time?

Hindle: I guess I'm old-fashioned. I have a tremendous loyalty to the organizations that I decide I'm going to join. And so I've never been even slightly tempted to leave Digital. It was always so much more important to me to build the enterprise than it was to jump in and go to somebody else's enterprise and perhaps compete with Digital. I couldn't imagine competing with Digital. It would feel just terrible.

There is nothing that would tempt you?

Hindle: No. I can't imagine what somebody could offer that would ever be appealing for me to leave here. Also I have an intense loyalty to Ken Olsen as a person because I feel as though I've learned so much from him over the

You could count on the fingers of one hand the people who founded a company and still were strong, vigorous presidents when they reached \$7 billion and 90,000 employees.

years, and I continue to learn things from him. He is a truly remarkable man and for some reasons that very few people understand.

For example?

Hindle: That he could run a company of \$7 billion and also be the founder. I don't know if you could count on the fingers of one hand the people who founded a company and still were

strong, vigorous presidents when they reached \$7 billion and 90,000 employees. He has made the changes that he's been able to make in his own management style because, obviously, running a 90,000-person company isn't the same as running a three-person company, which it was when he started, or 400 when I started.

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■ CONTINUED FROM PAGE 55

What is his key to success? His ability to listen and change his thinking?

Hindle: I don't think he's changed his thinking very much. The same principles that Digital was founded on are the principles we use today: respect for people, quality products, making commitments and keeping them with your customers. Very simple, fundamental kind of Boy Scout ethics.

Ken told me he felt that one of the things that scares him more than anything is success; that too much success for any one person is probably bad. What is bad about that in your mind?

Hindle: You get overconfident; you think you can't make a mistake. And that's the time you make your worst mistakes. When you think that you know everything, you're in the worst

position to make decisions because you think you're infallible. And we worry about that, and we're going to worry about that even more in the course of the next year or so. And I know from knowing Ken that he's even more critical in times when we're not so worried.

People have tried to tempt us into building mainframe computers with a mainframe mentality, and we said no to that. By and large, we just don't want to go in and contribute the same things that another company can do better. And as we proceed into the information systems market, for example, we don't go in and try to do the things that IBM does; we want to try to do something that's a little unique.

In terms of employees, I think it's the respect for the individual and the fact that we really do believe that the best ideas come from the bottom of the organization and come upward, rather than that they start at the top and are mandated downward.

More than 90,000 work for DEC. I have heard that despite the good times, there are still some problems internally with people disgruntled over cost cuts and pay-hike freezes. Hindle: Since every company of our size operates on a budget, I don't suppose there's any company in the world in which you get all of the budget money that you ask for. And that certainly is true here. We have worked on our budget very hard in order to obtain better financial results, and we're seeing the results. We are doing much better financially than we did several years ago. And that comes from some hard work at cutting costs and cutting inventories and not saying yes to every single proposal that comes forward. We do have to say no to some. And whenever you say no, you raise the possibility that somebody's going to be unhappy about that and could leave.

But as far as I can tell, we're at an all-time low in terms of departures. It's much, much lower than three or four years ago. At the senior levels in the company when we went through that tough period three or four years ago, we had nine or 10 vice-presidents leave the company within a year or two. That has just not happened in the last two years.

Were there people who left during that period that you wish had not?

Hindle: Yes. There's no question that some of those people could be making a contribution if they had the mind-set to do that. We've been, however, very cautious about rehiring people. We make it quite difficult for people to be rehired that have left.

Is there any specific reason for that — that they abandoned ship and are not welcome back?

Hindle: Sort of, yes. We went through a tough period, and we just don't like people that left when the going got hard. That isn't to say we don't hire some people back, because we have. But no ex-vice-presidents have returned, as far as I know.

DEC sales representatives work on salary, and that goes against the grain of most sales organizations. Have you addressed the question of giving commission to your sales representatives? Hindle: We have a program that we haven't talked a lot about in which the top 20% of our sales force do get an annual extra compensation based on the performance of the previous year. That's a program that was just initiated this past year.

What, in your area of responsibility, is receiving a lot of attention?

Hindle: We have some programs in information systems that relate to what I call the Cross-Organization Systems. We have one that is called Order Transaction Processing, a major system that cuts across the whole company. It's the system that starts when you send a quotation to a customer and ends up when you finally collect the bill. But it's the system by which we interface to our customers on order transactions.

When will that be in place?

Hindle: It's partially in place already, but we're redesigning it so that it becomes even more efficient and effective in line with our goal of making customer satisfaction our No. 1 criterion.

Are your customers complaining about poor billing procedures?

Hindle: No. Over the years they have, from time to time, said that our paper-work systems were not as easy to deal with as some other companies. It's an area that we have continued to work on because we think it's an important area for overall customer satisfaction. And we have improved it significantly in the last three years. Three years from now, it will be a really superb system. So we're halfway through the fixing process.

What is your greatest challenge for the next five years?

Hindle: It's to be able to allow our people and our organization to grow, to handle a much bigger size gracefully.

Obviously, we've got to do the smart things. We've got to make sure that the product line stays very competitive, as it is today. That we watch technology and use all the newest technology in designing and building; and I'm assuming we're going to do all those things.

The challenge for us is to allow the company to grow in size from \$7 billion into whatever in a way that is high quality — high quality externally as viewed by our customers and high quality internally as viewed by employees.

That means an awful lot of management development, an awful lot of improved systems by which we get our work done. It's a management challenge more than it is a technical challenge for us in the next five years — a management challenge to be as good as we want to be and to make sure we have enough people who are really good at managing a larger size organization.

When you grow as rapidly as we've been growing, you realize how relatively inexperienced the average employee is. When you're growing like this, your average employee has only been with you a couple of years and doesn't have the traditions or the knowledge of the company and its philosophies. So you keep having to train people, to bring them along more rapidly than perhaps they're ready to come along. You try to accelerate the learning process through training and through giving people challenging jobs.

How do you avoid the trap that most of the industry has fallen into of hiring large numbers of people only to be forced to lay them off in a downturn?

Hindle: That's the essence of manage-

ment — how to make sure your resources are in line with your customer needs but to do it in a way in which your financial results continue to please your stockholders. That's management.

Is there a formula that you follow or do you just do it by gut instinct?

Hindle: I have a little saying that I try to use whenever I try to determine what's the right thing to do: The three elements are quality, profit and growth. And I use them in that order. If you have a tough choice to make, make the one which leads to the highest quality first.

Once you've made that decision, then the second one leads to the highest profit. And the third one is growth.

In other words, growth is not the main objective. It's the result. Both profit and growth are the result of high quality. And if your products and your people are high quality, good profits and good growth will follow.

When people discuss possible successors to Ken Olsen, your name is clearly right there with two or three people who would be obvious choices. Are you an obvious successor candidate?

Hindle: We never discuss succession in

Success lets you get overconfident; you think you can't make a mistake. And that's the time you make your worst mistakes. When you think that you know everything, you're in the worst position to make decisions because you think you're infallible.

specific terms of individual people. Ken doesn't discuss it with us. He does, however, talk it over with the board of directors from time to time; and he has not planned a specific successor. His idea is that if you build good managers in the next couple of layers of management in the company, then when the time comes, the board of directors will have a good choice of a number of people that could possibly run the company when Ken decides that it's time for him to leave.

Do you feel you could run it?

Hindle: I've never thought about it quite that way because Ken has always seemed like he's going to be going on here forever.

Ken's idea is right. If he were to specify a particular person, then that would put a tremendous amount of pressure on that person. His idea is that you give everybody a lot of challenge and keep testing them as managers, and by the time we need a successor, probably some one or two people will be ready.

Some feel that although operationally the company would go on, there would be a void without Olsen.

Hindle: Well, he's a unique individual. And any unique individual who leaves an organization creates a vacuum for a period of time, and whoever follows as the chief executive will create a new kind of role model for people to follow. However, the Digital success thus far would indicate you ought not to try to fool with too many things that have made Digital a good place to be.

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BY KEVIN STREHLO

By conventional reasoning, DEC should be too big to do truly innovative research and too small to profit from an IBM-like, brute-force approach to research and development. DEC's \$717 million in R&D expenditures is, after all, second highest in the industry but only one-fifth that of IBM's annual spending. Yet in the past year, DEC R&D challenged such young and innovative companies as Sun Microsystems, Inc. and Apollo Computer, Inc. with its new Vaxstation II/GPX workstation and IBM itself on the high end with the VAX 8800.

What's DEC's formula?

"While we're much smaller, we try to be more focused," says Sam Fuller, the vice-president of research and architecture who oversees university, joint-venture, internal and consortia projects. "We don't have the luxury of bringing several projects all the way to fruition as some of our competition does."

But still there's the pressing question: If IBM's R&D efforts really cover everything, as common wisdom has it, how does DEC go about

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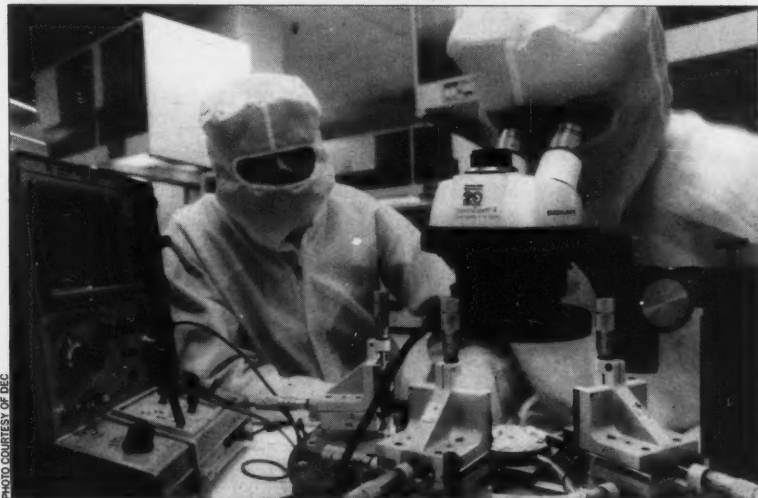


PHOTO COURTESY OF DEC

— which is all it seemingly could afford to pursue?

For one thing, concentrating on the VAX has cut the universe of possibilities that DEC needs to consider. "Having one common architecture is one of DEC's important R&D advantages," says Bob Djurdjevic, computer industry analyst and president of Annex Research in Phoenix. With IBM, he says, the requirement to support the different instruction sets encountered in the company's product line means multiplying the R&D two or three times.

The strategic focus on the VAX instruction set provides a framework for understanding DEC's research and development. It explains the efforts to stretch the VAX architecture and the preparations to replace it with as little customer disruption as possible when it finally runs out

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of gas. And it explains the apparent snafu of the canceled Jupiter project.

Before a DEC product makes it to the marketplace, it must cross through a series of gates that lead out of DEC's growing corral of basic research interests. Gate 1 marks the line between basic research and actual product development: A prototype is operational and first engineering measurements have been made, but the total investment is only about 10% of the cost of bringing a product all the way to market.

DEC uses this gate to keep its research cost-effective — on the order of half of all projects fail to clear it. The rest move into the actual design phase but still have as much as two to four years to go before they might enter the marketplace.

Gate 2 comes a year or more before a

product would enter the marketplace. At this point, with more than 50% of the development money needed to bring it all the way to market spent, another evaluation is done. If a product makes it past this second gate, an announcement target is set and revenue targets are developed. The intent is to bring it to market.

"We work pretty hard to get things through the first two gates," Fuller says, "and by the time they do, there is a low risk of technical failure. But there can still be some surprises."

Although the computer press had long written about the Jupiter project and implied that the upgrade to the Decsystem-20 was on the verge of introduction when it was canceled, the Jupiter project was no third-gate surprise.

"The Jupiter project never made it through the second gate," Fuller says.

Preliminary sales projections had indicated that the further investment in the family might not be paid back. "It was clear we needed to migrate people onto our 32-bit architecture."

While it is clear that final decisions on the viability of an R&D project get made at the top, DEC's overall R&D mechanism is complex. Computer graphics industry analyst Stanley Klein is not alone in thinking DEC's R&D organization "chaotic" while expressing admiration for its success. "Ideas [at DEC] are subjected to a rigorous natural selection process including peer review," he writes, "that determines whether an individual's pet project flourishes, remains in limbo or perishes. Even DEC employees express amazement at times that such a corporate approach works."

One of the advantages of that struc-

ture, Fuller says, is that it is porous to ideas bubbling up to the top.

"We had started out building a multi-chip MOS VAX processor," Fuller says, but his engineers were too proud to settle for old technology. "They wanted to more effectively compete with the single-chip processors like Motorola, Inc.'s 68000 and the National Semiconductor Corp. 32020."

DEC's silicon designers in Hudson, Mass., scribbled in the back room a bit and then insisted they could reduce a VAX to a single chip. "As soon as they could demonstrate the feasibility of it," Fuller says, "upper management grabbed the idea and instituted several projects to exploit it."

The Microvax II project, proved DEC was pretty fast on its feet for a company approaching \$7 billion in revenue and not known for advanced in-house very large-scale integration capabilities. While outside semiconductor vendors projected a minimal development cycle of 36 months, DEC used 30 full-time designers and had working silicon within two years.

Despite the success of this ad hoc internal research, as well as more formal internal efforts, Fuller says, "In many cases DEC gets more value from the dollar invested in external research contracts done in the open than from proprietary research."

One of the most successful such investments dates back to early 1972. At the time, the batting average of the technical editors in charge of checking compatibility of system components before DEC shipped them had slipped to 0.700. While great for baseball, that percentage did not impress the 30% of customers who were having trouble getting their systems running, and DEC management was concerned.

DEC's head of manufacturing technology at the time, Dennis O'Connor, mentioned the problem to a Carnegie-Mellon University professor, John McDermott. McDermott astounded O'Connor by saying he thought he could not only capture the uncoded expertise of DEC's technical editors in a computer program but surpass it. DEC's funding of McDermott's research eventually led to Xcon, the expert system that correctly configures VAX system orders 95% of the time.

Since brought in-house with McDermott as a consultant, the effort has grown to more than 200 individuals under Frank Lynch, head of engineering for DEC's intelligent systems technologies. Products from that effort include VAX LISP, ASP 5, the Vaxstation II artificial intelligence workstation and a healthy business in expert systems consulting to selected DEC customers.

Moreover, Lynch says, it has led DEC to pursue the concept of improving the efficiency of manufacturing businesses through an integrated network of expert systems focused respectively on design, manufacturing, distribution, sales, service and configuration.

In addition to maintaining its close, traditional ties to universities by investing millions of dollars in about 10 major joint efforts at a time, DEC participates in several industry consortia, including the Microelectronics and Computer Technology Corp. in Austin, Texas.

Typically, the advances made in external research projects are expected to be fundamental in nature and many years from implementation. Fuller says that ideas that creep into DEC this way "are passing through Gate 0."

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But sometimes results are seen quite clearly in a specific product passing Gate 3 in no time flat. Indeed, although the main intent of DEC's investment in MIT's Project Athena was to investigate the behavior of a very large network of distributed workstations — "It makes a great test bed, and there's no harsher environment," says Jack McCredie, head of DEC's External Research Program — they've also gotten a product.

When marketing needed an impressive human interface with which to showcase the new Microvax II at a Decworld show in January 1985, Fuller says, the windowing system from Project Athena was pressed into service.

When senior DEC management saw it at the show for the first time, they were smitten, especially when they found out it had been developed with DEC money. Only one year later, an enhanced version of the software was introduced as DEC's Xwindows package on the Vaxstation II/GPX.

Perhaps most important to DEC in the long run is the research proceeding apace on the West Coast, far from the company's Maynard, Mass., headquarters. DEC's System Research Center in Palo Alto, Calif., and the Western Research Laboratory up the street may be to 1990s computing what Xerox Corp.'s Palo Alto Research Center (PARC) has been to the 1980s.

Indeed, PARC's legacy is strong. Bob Taylor, who ran PARC for more than a dozen years, is head of the System Research Center, and among DEC's Palo Alto engineers are three of the four people named on the patent for PARC's networking project, Ethernet.

The Western Research Laboratory has spent the last four years looking into reduced instruction set computing (RISC) systems.

And while DEC officials will not comment on unannounced products, sources say that basic research in RISC technology has already been transferred to an advanced product development center in Bellevue, Wash., where it is currently being guided toward Gate 2 by VAX 8800 architect David Cutler.

Fuller will say only that DEC will eventually have to move to new technology "if our customers are going to have cost-effective products available to them. If you use ideas like RISC, it will change the instruction set interface. We're saying this was a fine interface for the 1970s.

"For the late 1980s, we'll preserve the operating system interface and data-type compatibility," Fuller adds. But he expects the customers will see no more level of change "than when they went from the VAX-11/780 to the 8600."

Meanwhile, at the System

Research Center, Taylor and a crew now numbering more than 60 engineers have spent 2½ years looking at how to transparently utilize multiple processors in an extended networking environment. The resultant experimental Firefly workstation already taps the power of five Microvax II processors, Taylor says.

Although RISC research seems to get more attention, multiprocessor research may prove key to DEC's future. As

DEC's former vice-president of engineering Gordon Bell wrote earlier this year: "The number of processors [in a system architecture] will have the greatest long-term effect, regardless of the number or type of instructions they execute."

More important even than multiple processors, however, may be the concept of universal and transparent access to the resources of a number of machines. The Systems Research Center is also heavily

involved in that arena, which carries back to Bell's reign as vice-president of engineering from 1972 to 1983.

"When I was at DEC, we called it Gordon's vision," says Craig Symons, a Gartner Group, Inc. analyst. "The idea was to forget about single machines and create a network that provided universal access to resources."

Fuller says that DEC has some of the basic protocols and software in place to realize that

vision, but he compares the current state of the art with the crude form of time sharing available back when the PDP-1 was introduced. Yet DEC's emphasis on connectivity in its R&D is already paying dividends. "People don't draw a VAX 8800 on the board if they want to buy the most effective quarter-million-dollar super-mini," Fuller says. "They draw an Ethernet system with a dozen workstations and a VAX 8300 as file server."

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EATON

Systems engineers at Eaton Corp.'s Manufacturing Service Center in Willoughby Hills, Ohio, are traveling almost 30% less since the setup of a DEC Ethernet network with links to both a pre-existing corporate network of DEC equipment and an IBM network spanning five foreign countries and the U.S.

Decnet's Systems Network Architecture gateway capability and the addition of parallel processors to two VAX-11/780s and a Microvax II allow staff at the center to use their VT100 terminals as if they were also both IBM 3278 terminals and IBM Personal Computers. "For the cost of a single VT100 terminal, we can give our users not only the power of the VAX on their desktops, but also allow them to use the full range of IBM PC software and 3278 access to IBM computers in six countries," according to Willard Burge, manager of manufacturing systems engineering.

The fact that an engineer in Ohio can remotely access an IBM system in Italy to perform software diagnostics is, Burge says, "directly attributable to the networkability of DEC hardware and software." And just in terms of travel time and costs, that networkability produces tremendous savings for the corporate services staff in Ohio. This group provides technical support to all of the conglomerate's manufacturing facilities, from plants producing automotive transmissions to ones turning out measurement probes for silicon chips. "Before we got this network up, we used to

have to travel about 90% of the time when problems came up at plant locations," Burge says. "Now that average has dropped down to about 63%."

Actually, Burge says, the concept of making multifunctional use of terminals has been carried one step further at the center, where some users are equipped not with VT100s but with Modgraph, Inc. computer-aided design terminals that are completely VT100 compatible. Using these terminals, design engineers can time-share three-dimensional CAD on the network.

Anvil 4000, a CAD software package produced by Manufacturing Consulting Services, runs on both the VAX-11/780s and the Microvax II.

"As a rule," Burge notes, "CAD is not thought of as a time-share application. But this serves us very well for the rough work and allows us to get multiple usage out of the same terminals, which will also function like VT100s or IBM Personal Computers. When we need to do finished work, we simply switch over to more expensive CAD workstations."

USX

There's no doubt in Sam Abston's mind about the advantages of using DEC systems for order tracking and process control in a mill setting. "I think DEC equipment is great," says Abston, manager of systems development at USX Corp.'s Fairfield Works in Fairfield, Ala. "In fact, if I ever went into business for myself and had to set up a tracking system for a small steel mill, I wouldn't even consider any other equipment."

There's a qualification in Abston's recommendation though, and it has to do with size or, to be more precise, independence. What works beautifully for a single, self-contained manufacturing operation may not be acceptable in a large, multisite corporation where consistency is important and the majority is

going in a different direction.

That's what is happening within USX, and it is the reason why Abston suspects that the collection of VAXs and PDP-11s in place at the Fairfield Works will eventually be replaced by IBM equipment. Most of the mills within USX's extensive system already use either IBM or Burroughs Corp. equipment for order and production tracking. In the interest of consistency, the corporation may soon standardize on IBM, he expects.

Right now, the Fairfield site uses a Burroughs 5900 to handle front-end communications between the two VAX-11/780s handling order planning and tracking and the corporation's central IBM billing computers in Pittsburgh. Communications between the VAXs and the Burroughs 5900 and between the Burroughs and IBM equipment is accomplished through the use of a 2780 protocol. The VAXs in the business office are linked to VAXs and PDP-11s handling process control throughout the site's several mills — a primary mill, a seamless sheet mill and a tin mill — through a Decnet Ethernet network.

The conversion, when it comes, will not be easy. For one thing, the Fairfield Works has developed about 3,000 programs for its DEC systems, covering every phase of the operation from order entry and production scheduling to metallurgical testing and shipment. But beyond that, Abston says, it will be hard to match the ease of operation of the DEC systems. "The PDP-11s were easy to program on," he says. "In fact, that's why we chose them to begin with ... because we needed to get off the ground fast, and they lent themselves to quick development. The VAXs are even easier."

Still, Abston notes, that is the voice of experience talking. To transferees from other mills, who gained their experience on other systems, trying to adjust to the DEC equipment can be difficult

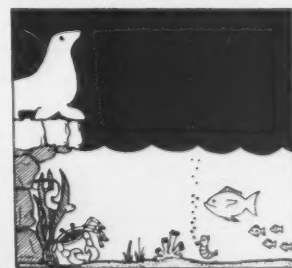
and time-consuming. In a company like USX, where relocations are frequent, that kind of learning curve can become a major obstacle to operational efficiency.

WOODS HOLE OCEANOGRAPHIC INSTITUTION

Distributed computing with broad-scale network access is the key concern these days at the Woods Hole Oceanographic Institution in Woods Hole, Mass. And that means something quite different from a local Ethernet network running Decnet.

"What we are trying to deal with now is an increasingly decentralized computing environment and the need to provide network facilities that will allow our scientists to collaborate with their colleagues around the country ... or even the world," says Skip Little, manager of the information processing and communications laboratory. That means establishing connections with external networks like MIT's Proteon, which serves as a gateway to a Cray Research, Inc. research computer at the National Center for Atmospheric Research in

■ CONTINUED ON NEXT PAGE



These user stories were written by Joanne Kelleher, a Boston-based freelance writer, and Michael Sullivan-Trainor, a Computerworld senior writer. The illustrations were drawn by Mitchell Hayes, Computerworld graphics editor.

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Boulder, Colo., or to the National Science Foundation's high-speed network connecting supercomputer centers at several major universities around the country. It also means conforming to the only commonly accepted non-vendor-specific protocol currently available — Transmission Control Protocol/Internet Protocol (TCP/IP).

With this increasing emphasis on connections to external networks and remote supercomputers, DEC's role is no longer as assured as it once was at the facility. DEC equipment now dominates centralized computing. Two VAX-11/750s are dedicated respectively to image processing and business data processing, and a four-machine Vaxcluster coexists with one VAX-11/750 and two VAX-11/780s supporting scientific projects and time-share applications.

In terms of its file-sharing facilities, the cluster is "just beginning to bear fruit," according to Bob Groman, research specialist and computer systems supervisor, since — until a recent upgrade in the operating system — "it wasn't really anything more than a faster Decnet channel." Still, the future demand for centralized computing appears cloudy to both Groman and Little.

"I think," Groman says, "that there will always be some need for centralized computing capability. But eventually, the central facility may be just a central computing engine — perhaps a VAX or perhaps something else — that acts as a disk server and supports magnetic tapes and graphics devices."

What is different now, Groman explains, is simply that scientific workstations and networks have come of age. "You can get a workstation now that is

the equivalent of a VAX-11/780 and hook it into a network that will give it access to the power of a Cray."

As users migrate to smaller dedicated systems with linkages to outside networks and computer power, they may choose to move to Microvax IIs. There are already seven of these, plus two Microvax Is, operating within project groups. However, opinions about the VAX line are much more divided at the work-group level than they were in the centralized systems area.

In 1977, Groman recalls, when the institute was searching for a 32-bit machine to give it more computing power, the VAX-11/780 simply overwhelmed the competition. At the workstation level, the Microvax does not have such a

clear advantage. In fact, Groman notes, there are many ardent fans of Sun Microsystems, Inc. and Apollo Computer, Inc. workstations among the user population.

The scale may also be tipped by the necessity of adapting to the TCP/IP protocols necessary for connection through the outside networks. Right now, it is possible to adapt VAXs to those protocols, Groman says, but as far as he knows, there's only one way to do it and that is to buy a software package from Wollongong Group, Inc., which costs about \$18,000 per CPU.

Networking is now the name of the game, Little observes. Networks are now more important than the equipment on them. "DEC may continue to play a strong role, but only if its products are good enough to win over users."

ROCKWELL INTERNATIONAL

Illustrating the importance of third-party software in the choice of a hardware vendor, engineers at Rockwell International, Inc.'s automotive division use DEC minicomputers because it is the only way they can keep up with the latest versions of their software applications.

According to Bill Craig, engineering systems manager, "We've gone from a Data General Corp. Eclipse to a Hewlett-Packard Co. 3000, and now we're using a PDP and a VAX. The two previous machines were good machines, but in the scientific engineering area, there's not that much that runs on them."

"Most all of the software companies in this market will first develop their applications on a DEC and then port it to other machines. If you want to be up with the most current revision level, the machine you should have is a DEC, because that's going to be the first revision that's released."

Based in Troy, Mich., Craig's department provides computer support for engineers in the automotive division, which manufactures components like axles and brakes for 18-wheel trucks, as well as parts for passenger cars and light trucks, including plastics, sunroofs and door latches. A \$2 billion part of Rockwell's \$11 billion business, the division also runs computer-aided design (CAD) operations in six remote plants.

While using the Data General and Hewlett-Packard equipment, Craig's staff developed the majority of their applications in-house. To save time and effort, the company shifted to using off-the-shelf packages, which in turn led to the equipment switch.

"We wanted to change our philosophy from an attitude of writing software internally to buying packages that could already solve our problems. Rather than spend 18 months developing a system for testing or for a data base, we started buying third-party packages," Craig says.

This reasoning also applies to the kinds of DEC minicomputers used with-

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in the department. For example, despite its deficiencies when compared with the VAX, the company continues to use a PDP-11/84, because the testing application that runs on it is not yet available for the VAX.

Acquired a year ago, the PDP runs a series of stress-testing software from MTS Systems Corp. of Minneapolis. The software allows engineers to test a particular automotive axle by simulating its stress capabilities under different road conditions. After the simulation, the data is summarized and sent to a VAX-11/785 for inclusion in a data base.

Connected to the PDP by Decnet, the VAX operates as an engineering time-sharing system for about 125 users who access it from IBM Personal Computers running terminal emulation programs.

Craig hopes to replace the PDP with a VAX when the testing software becomes available for the VMS operating system. The PDP's deficiencies, when compared with the VAX, include its slower 16-bit system and Unibus structure vs. the VAX's 32-bit system and enhanced Multibus, Craig says.

Within the next few years, Craig foresees the addition of a few Microvaxes to allow a departmental-level distributed processing system. However, concerns about the control of data need to be addressed before that takes place.

Other equipment at the site includes 43 workstations connected to an IBM 4381 running CAD software. The engineers take geometric data generated on the CAD system and transfer it to the VAX for analysis using the International Graphics Interchange Standard format.

LAWRENCE BERKELEY LABS

After replacing outdated Control Data Corp. processors with a Vaxcluster, Lawrence Berkeley Laboratories of Berkeley, Calif., was able to lay off its 30-person operations staff.

"It was a drastic change from a batch-type system that was highly tape-intensive to an interactive system that provided good connectivity," says Marvin Ashley, head of computer services for the laboratory.

The facility made the change because the maintenance cost for two CDC 6600s and a 7600 was \$800,000 annually, compared with \$250,000 in maintenance for the Vaxcluster, which includes four VAX 8600s and a VAX 8650. Roughly 20 million instructions per second of processing power are achieved by the cluster, comparable with that provided by the CDC processors.

While 40 users could work on the CDC equipment interactively, 150 use the Vaxcluster, which features 248 ports.

Ashley's only complaint about the DEC equipment is that the VMS-X.25 network interconnection is too slow to be useful for scientific applications. While there is no X.25 network installed at the site, scientists wishing to exchange information with other laboratories require the connection, which DEC is reportedly upgrading.

The laboratories are one of the multi-purpose labs operated by the U.S. Department of Energy. Applications run on the cluster include nuclear, life and energy science research.

For administrative purposes, Focus, a fourth-generation data base from Information Builders, Inc., and Datatrieve, DEC's data base software, are used on the cluster as well.

Designed for the IBM mainframe environment, Focus has been adapted to the VMS operating system. At Lawrence

DECUS grows with DEC, attracts end users

Clair Goldsmith is president of the Digital Equipment Computer Users Society's (DECUS) U.S. chapter. DECUS's next symposium will take place in San Francisco from Oct. 6-10; the spring 1987 meeting will be held April 27 to May 1 in Nashville.

Membership is free to anyone expressing an interest in DEC products; members pay for DECUS services used, such as subscribing to newsletters or attending a symposium. Membership information is available from DECUS, 219 Boston Post Road, BP02, Marlboro, Mass. 01752.

Goldsmith, who is the executive director of information technology at the University of Texas's Health Science Center at San Antonio, spoke in Boston to Extra Editor George Harrar.



How did DECUS originate?

Goldsmith: DECUS started in 1961. At that time, hardware was very expensive, and programmers and programming were perceived to be very expensive but difficult to create. The first computer Digital built was the PDP-1. Some people met to put together a library so they could exchange programs. From that we built DECUS, which is probably the largest users' group in the world — about 45,000 members in the U.S. and close to 90,000 worldwide. As Digital has grown, so has DECUS.

What is the mission of DECUS?

Goldsmith: The purpose is to promote the exchange of information among users. That user base continually expands. The products reach more and more people who are less and less technically aware.

DECUS still has a fundamental goal of providing the technical information both from Digital to the users and between users. But there is no question that what we see at the symposia are

more people who are more like end users rather than computer center people. We are not as clever at servicing that market as we have been servicing our historical bloc.

Why, from a user's perspective, did DEC's fortunes take off in the last year?

Goldsmith: I think it started five to eight years ago when Digital recognized everything ought to work well together. They've come out with the products that, while diverse, are coherent.

Was there a call from users five to eight years ago for this connectivity?

Goldsmith: I think so. People recognized the need to interconnect machines. The systems you put in today, while you may not see how they need to cooperate, may in two or three years, in fact, need to cooperate. Users wanted systems that provided the opportunity to interconnect.

Has DEC been leading users or users leading DEC?

Goldsmith: Conceptually, it probably came from Digital. But I do know that DECUS has had more involvement with engineering since Day 1. There has been a lot of opportunity for users in small groups of 10 to 12 people — half Digital and half users — talking about where they want the products to go. I can't take a specific product and say users designed it — that didn't happen. But philosophically, those discussions led to what users needed from engineering.

What hardware do you run at your site?

Goldsmith: I have three Decsystem-20s arranged in a cluster. There are three VAXs clustered and a Digital Ethernet that supports between 800 and 900 terminals and micros. We have an integrated institutional data base that consists of 1,000 files and 2,000 programs that supports budget, payroll, accounting, personnel. We also do

all research work for the institution.

What is still a weakness of DEC in users' minds?

Goldsmith: The earliest weakness we determined is that they had a good product set but didn't have — and may still not have — name recognition outside of the computer industry.

Consequently, you meet a lot of people in upper-middle and upper management who may not have heard of Digital. To some extent, Digital is doing so well in the last 12 to 18 months that it has turned some of that around. But Digital has never made a real strong effort to be a nationally known company outside of the industry in which it is used.

Would your job be easier if DEC advertised more, on TV, for instance?

Goldsmith: It would be to Digital's advantage if it had better name recognition.

What else does DEC need to improve — product planning, for instance? You bought three Decsystem-20s, which have no future.

Goldsmith: That's right. No one is happy about that situation because you invest a lot in writing programs and building systems around that architecture. However, we are in the process of using VAXs to do some of the same things. We've moved some jobs over, and because of the networking capabilities, we can have a data base existing on 20s, which can be accessed off of the VAX.

Yes, it is an expense to go through that migration, but you are changing technology to a more cost-effective solution. It's still cheaper to convert to a VAX than go completely away from Digital.

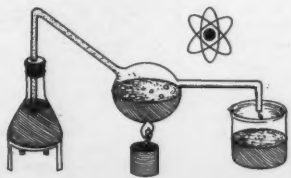
For how long do you expect to use the 20s?

Goldsmith: We would like to phase them out by 1990. But as the price of oil comes down, our ability to do some things gets curtailed.

Berkeley, financial data residing on an IBM 3031 and a 4341 is accessed through the Vaxcluster using an Ethernet connection.

The data is used for budget monitoring and tailor-made financial reports. Some users also download files from Focus to IBM Personal Computers for Lotus Development Corp. 1-2-3 spreadsheets.

Focus was chosen by the laboratory, which was a beta site for the product, because the financial data was originally downloaded from the 3031 to IBM PCs for processing on the PCs, and Focus was the only product that could operate in both environments. The cluster proved to be a much faster way to provide applications to the end users.



ATLAS STEEL RULE DIE

The two-person data processing department at Atlas Steel Rule Die, Inc. in Elkhart, Ind., is taking time out from a two- to three-year backlog of pending applications development work to re-write existing applications.

"We have to do this to save memory," says Deborah Schemenauer, head of DP. With 46 users accessing the company's VAX-11/780 for accounting, budgeting, order entry and order scheduling purposes, even the expanded memory (8M bytes) is no longer enough.

That is also the reason, Schemenauer says, that the company is still making do with Version 3.7 of VMS. "We'd like to move to Version 4.0, but it takes about 20% more memory," she says. "Right now, we just don't have it."

An obvious way to get extra memory capacity would be to trade up to a VAX-11/785, according to Schemenauer, but Atlas does not want to implement what would be an interim solution at best — and an expensive one at that.

"We don't want to invest in that

machine when we know that what we really want to do in the near future is go to a distributed mode," she says. "With \$80,000 or so that we'd be putting into an 11/785, we could probably buy a couple of Microvaxes."

The firm is still weighing equipment options to find the most efficient mixture for distribution of its currently centralized relational data base, Ingres, from Relational Technology Inc. Right now, Schemenauer says, Atlas, which already uses one Microvax I and two Microvax IIs for programming purposes, leans toward a clustered configuration of several Microvaxes and either a VAX 8200 or a VAX 8500.

"All we really know for sure," Schemenauer adds, "is that we have to move into a distributed environment because it will be a lot more cost-effective. And when we have to expand, we'll be able to do it machine by machine."

All of the rewrite work the DP department has been doing to tighten code and conserve memory will not really be a wasted effort, she says, since the applications will still run under 4.0. "Anything we're doing now will just make us more efficient in the long run."

EXTRA

NIKE

Nike, Inc. of Beaverton, Ore., is divesting itself of its six Decsystem-2060s and switching to IBM. Dave Thomson, technical services manager at the athletic products company, will be sorry to see the last of the old machines go, even though their departure has been inevitable since before the last three were purchased.

"I'll always think of the 20s fondly," Thomson says. If for no other reason, he regrets their loss because they made some parts of his own job so much easier. IBM equipment, like the 3090 that Nike is moving to, requires more work. "It takes people who really know what they are doing just to install software on the IBM," he says. "From a technical services point of view, the volume of work involved is just much greater."

If there had been a follow-up system in the 36-bit line, one that would have allowed Nike to consolidate its operations, the company might have stayed with DEC, Thomson says. But after the manufacturer announced the discontinuance of that product line and switched its emphasis to the VAX, there just was not reason enough for making the extra effort it would have taken to stay with DEC.

Nike did purchase three Decsystem 2060s after the announcement of planned obsolescence, but only to provide necessary capacity while it considered its options. Obviously, that was only a stopgap measure. "It is very difficult to run a business on six separate machines," Thomson says.

The one thing that might have convinced the company to cast its lot with the VAX line, according to Thomson, would

have been a ready-made software base that included both financial and warehouse management applications. Nike did go looking in both the DEC and IBM worlds for an order processing and inventory package that could relieve the necessity of having to write its own programs.

IBM had something of an edge in the financial area, Thomson recalls. "DEC was definitely making some progress, but IBM already had quite a few packages available in that category." Even so, he says, order management was considered such a priority that a really good product of that type would have been more than enough to tip the balance.

As it turned out, the search narrowed to one package for each manufacturer's equipment, and both were discarded as inadequate. When Nike realized it would have to develop its software from scratch, the decision tilted toward IBM.

"If that package had been there, we probably would have stuck with DEC," Thomson says, "but when it came down to writing everything ourselves, it just seemed like it would be a lot faster on IBM."

Nike acquired an IBM 4381 for the development work a year ago, and, at the rate it is progressing with applications being written using IBM's DB2 cross-system product, its X-generation language and various program development tools, Thomson does not expect it will be long before the Decsystem-20s roll out the door.

"I'll be sorry to see them go," he says, "but even more than that, I'm sorry to see the Decsystem-10s and -20s disappear from the market. The VAX is a very good hardware box, but those were greater user systems."

MA-COM

Plagued by repeated head failures in its disk assemblies, MA-COM, a San Diego defense electronics company that produces modem and satellite links, recently replaced some of the RA-81 disk controllers on its DEC VAX systems with a product from a third-party supplier, Systems Industries.

The move was not undertaken lightly, says Cecil Hawkins, manager of data base administration, who works directly with two VAXclusters consisting of VAX 8600s and VAX-11/785s. "DEC had replaced the head disk assembly on every one we had," he says. "And I know of at least one that they replaced three times."

DEC was aware of and willing to deal with the problem in terms of replacement, according to Hawkins. "Their own engineering people told our operations manager that the head and surface play on the RA-81s was equivalent to flying a 747 10 feet off the ground," he says. Unfortunately, there was more involved in recovery than mere replacement. "When a system crashes because of a disk failure, it can easily take me all night long," Hawkins explains, "just to recover the data base."

It is Hawkins' impression that the disk controller has now been re-engineered and stabilized, but he is quite satisfied with the alternatives. In fact, he says, the System Industries' disk controllers perform so well that the company is considering the purchase of another of its products, a disk cache controller with 8M bytes of random-access memory storage.

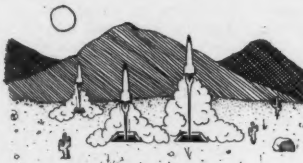
"You can keep the most active blocks in this memory instead of reading and writing to the disk constantly," Hawkins says. "If I can put my root file in there, for example, that will save me a lot of time."

Time efficiency is particularly important to Hawkins right now, because he is facing the task of reorganizing and migrating a giant data base that is now running on two of the company's five Decsystem 2065s. Actually, this process will be in two stages. First the data base must be logically divided among the Decsystem-20s as the company effects a procedural separation among units handling government development, commercial products and video research. Later, as the Decsystem-20s are replaced by VAX 8600s, the data base will have to be rewritten for the VAX environment.

In one sense, Hawkins welcomes the challenge. "Moving over to the VAXs gives us a chance to start fresh," he says. "After 10 or more years of more or less haphazard growth, the systems here really need to be sorted out."

There is one aspect, howev-

er, in which the Decsystem-20s were found to be superior to VAXs. "VMS DBMS developers," Hawkins says, "have a tendency to try to solve applications problems with systems solutions." In the interest of security, for example, DBMS developers have disallowed direct key access for extraction of selected records across a number of files. "On the Decsystem-20s, we could extract the particular records we wanted, sort them and replace them. On the VAXs, we can't just pull out the pieces we want — we have to extract the whole file."



UNIVERSITY OF TEXAS

There was a time when the Health Science Center at the University of Texas in San Antonio relied primarily on remote job entry terminal connections to a variety of IBM systems for administrative computing. When Rhon Buxton, manager of administrative systems, arrived seven years ago, the only DEC presence in the facility was a single Decsystem-20 used for medical research.

In the past few years, however, the center's orientation shifted almost entirely. Aside from the processing of an occasional tape from an IBM mainframe based in another part of the university and a few terminal connections for special applications implemented through the center's Ethernet local-area network, the environment is now totally DEC.

Most of the 600 terminals connected to the network are VT100s, with a scattering of VT220s, Rainbows and Dec-

mates. Three Decsystem-2060s operating in a cluster mode with DEC's Common File System currently support most of the administrative functions that the center performs in support of the school's medical, dental, nursing and health science divisions. A Vaxcluster — one VAX-11/785 and two VAX-11/750s — is now used mostly for software development and research applications requiring statistical and graphics capabilities.

Two factors are primarily responsible for the center's tilt toward DEC. For one thing, Buxton says, application development is easier on DEC equipment than on comparable systems from other vendors like IBM, Control Data Corp. and Burroughs Corp. That was a major consideration when Decsystem-20s were initially purchased. "They were just more capable and allowed us to set up prototype applications more quickly," he says. It was also one of the reasons why the center elected to stick with DEC when its 36-bit line was discontinued. "If anything, the VAXs seem to be even more flexible in that regard."

Perhaps even more central, however, was the issue of connectivity. "We just think that DEC has a better concept of integration than any of the other vendors," Buxton says. This networking vision is particularly important, he explains, because the center is interested in moving toward a more distributed configuration, with clusters of small VAXs operating as departmental systems.

It will probably be some time before that goal is realized, since the center is still in the early stages of what Buxton anticipates will be a three-year conversion to a total VAX environment. A recently purchased VAX 8650 replaces one of the Decsystem-2060s, and it will be several months before the payroll, personnel and benefits programs running on the original machine are ready for transfer.

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STANDARD OIL

A Vaxcluster can be a real performance booster, according to Dennis Tellerico, group manager for computer services at Standard Oil Co.'s research and development center in Warrensville, Ohio. But keeping one tuned may involve more than most purchasers bargain for.

"If you're going to get into the cluster business," Tellerico says, "you'd better make sure that you either have enough qualified staff to help you support it or are willing to spend some big bucks on DEC consulting services."

Tellerico's staff includes four systems programmers, two of whom have been spending substantial time on system tuning since the center activated its cluster last July, so he has resorted to calling in a DEC specialist only once. Unless you are dealing with a fairly fixed environment, he says, the adjustments required to maintain system performance when memory is upgraded or users are added call for either expert assistance or a high tolerance for trial and error.

The problem, Tellerico explains, is that cluster technology is so new that there hasn't been time to develop good documentation or maintenance utilities. "It would be nice to have some more sophisticated tools available," he says. "Unfortunately, there isn't really a manual you can turn to. DEC does have a tool called Autogen that is supposed to give you a good start on checking performance, but... well, although it does give you a start, I'm not sure I'd say it's a good start."

In all fairness, Tellerico notes, it is not really possible, when you are writing a program like Autogen, to anticipate how people are going to be implementing the systems. VMS systems in general and clustered VMS systems in particular are known to take up a lot of memory, so upgrades are to be expected. But most cluster installations are probably not quite as demanding as the research and development center at Standard Oil.

The cluster there consists of one VAX-11/750, two VAX-11/785s, two VAX 8600s and one VAX 8800 with four HSC50 disk controllers and 20 RA81 disk drives with a capacity of 456M bytes apiece. The cluster is used for applications in providing technical support for the company's refineries and for researching fuel formulations and oil production methods.

Roughly 800 users can access the Vaxcluster — as well as 25 lab-based PDP-11s, the corporate scientific Cyber system from Control Data Corp. and several of the corporation's IBM administrative systems — through 1,000 terminals interfaced to a Develcon Electronics, Inc. port selector.

Results of laboratory experiments performed using image processing on PDP-11s are downloaded to the Vaxcluster for further analysis via a Decnet Ethernet network. The cluster also serves as the processing engine for knowledge engineering activities performed on LISP workstations, for SAS Institute, Inc. statistical analyses, for laboratory project management using Bolt, Beranek and Newman, Inc.'s RS/1

automated laboratory notebook software, for modeling and simulation using internally developed programs and for a heavy volume of text and graphics processing generated on Masscomp Co. terminals running Mass II word processing software from Microsystems Engineering Corp. and an adjunct package, dubbed Massgraph, developed at the center.

In implementing the cluster, Tellerico says, the center was able to merge four discrete VAX systems, eliminating the necessity of installing and maintaining multiple versions of every software product.

Equally important, he says, is that the Vaxcluster ensures a more consistent level of service. An interactive load-balancing facility directs traffic during surges in user demand so that there is no degradation in response time.

BRANDEIS

To meet the demands of a wide spectrum of academic research applications, as well as standard administrative functions, Brandeis University last year chose DEC's Vaxcluster over more traditional IBM and Control Data Corp. number crunchers.

Utilizing a VAX 8600, combined with two VAX-11/785s, the university's computer center provides the processing power necessary to meet the diverse applications in a single operating environment, says Ira Solomon, assistant vice-president for information services.

"We looked at Control Data, IBM and DEC. Control Data did not have a satisfactory administrative package at that time, but the number crunching was there. So it became a choice between IBM and DEC," Solomon says.

IBM equipment would require IBM's VM operating system to handle the faculty's research demands, while the administrative applications were available only in IBM's MVS and CICS.

"I was faced with: Could I afford to support two operating systems?" Solomon says. "If I had given the academic community MVS, they would have tarred and feathered me and rightly so. I knew CICS would eventually come to VM, but when?"

Rather than wait for IBM to combine VM and MVS, Solomon chose the Vaxcluster and its VMS operating system.



■ CONTINUED ON NEXT PAGE

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■ CONTINUED FROM PAGE 65

"It wasn't a question of a bigger bang for the buck, because we were offered educational discounts from both vendors that a commercial buyer would never see. It came down to the cost of ownership," Solomon says.

In addition, Solomon says he feels the Vaxcluster will be easier to upgrade than a comparable collection of IBM systems would be.

The university is also installing a new data network, which is based on Ethernet, and there was more support on the DEC side for such an installation than on the IBM side, Solomon adds.

"DEC understands about networks. With IBM, I get the feeling that they do not have anything to offer once you get beyond 3270-type hardware," he says.

Other equipment at Brandeis includes a Decsystem-20 series computer, about 200 IBM Personal Computers — many used in terminal mode — a half dozen DEC Rainbow personal computers as well as approximately 110 DEC VT220 terminals.

The 8600 runs research applications ranging from radio astronomy to protein structure analysis.

One of the 11/785s handles administrative processing, such as financial aid records and accounting, while the other unit runs word processing applications.

Administrative software is supplied by Information Associates, Inc., a Rochester, N.Y.-based firm specializing in university administrative packages.

Academic applications are provided by statistical packages — such as SAS Institute, Inc.'s SAS — and by specialized radio astronomy or scientific programs.

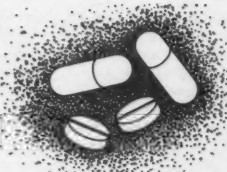
A fourth-generation data base from Information Builders, Inc. called Focus, as well as various graphics applications, are also available on the DEC system.

Prior to acquiring the DEC equipment, Brandeis used a Data General Corp. MV/8000 for its administrative applications, but the university felt that the system did not meet its processing needs.

BEECHAM PRODUCTS

Spurning the IBM environment prevalent at corporate headquarters, researchers at Beecham Products, Inc.'s laboratory selected a DEC Microvax II to be the hub of their computer configuration.

"Primarily, it was the ease of operation that caused us to go to a different vendor," says Tom McGrath, Beecham's com-



puter scientist. "Our MIS department is very business-oriented. We are a scientific site, and there was a lack of understanding of what our needs

were. It was also difficult to get the IBM mainframe to run our scientific software.

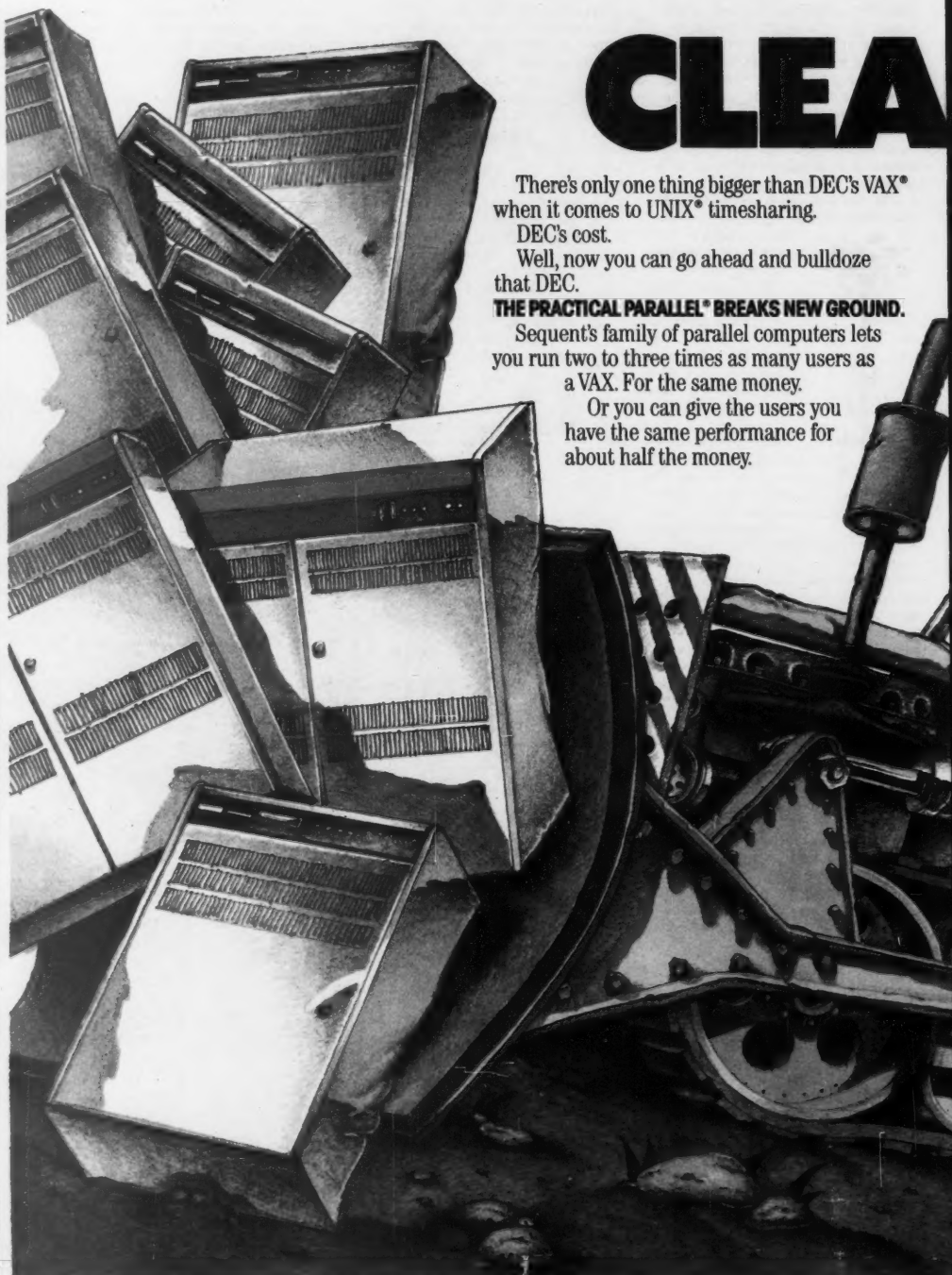
"In addition, the response time on the mainframe was just killing us. It was just terrible. We would have to wait for jobs to run, because we're a remote site."

Headquartered in Pittsburgh, Beecham Products manufactures household products and over-the-counter drugs. Primary data processing is provided by an IBM 3083, located

at headquarters. The research laboratory, in Parsippany, N.J., runs the Microvax II as well as several DEC Professional 350 desktop computers.

The Professionals are centrally located on two floors of the research laboratory building. They are connected by Decnet to the Microvax II and are operated at staggered intervals by about 50 users.

Installed in April, the Microvax II runs the fourth-generation data base package from



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Information Builders, Inc. called Focus, and SAS, a statistical analysis package, from SAS Institute, Inc.

Using the two packages, the lab develops estimated expiration dates for drug products. While Focus keeps track of the date and other information about a product, SAS analyzes the files and produces projections of future expiration dates.

Having recently installed the applications, McGrath was pleasantly surprised by the

smoothness of the process. "I didn't expect it to be as easy as it was. Within three or four days, we were up and running," he says.

One thing that made the installation easier was a tip from the makers of SAS who recommended that the lab purchase the complete VMS documentation, because the documentation that comes with the Microvax II had some deficiencies.

"I was disappointed in the documentation that came with

the Microvax," McGrath says. "I had never worked on VMS before, and coming from an IBM world, I was looking for other answers than what they provided. The VMS information helped me set up the Microvax II as the main CPU in the building. The approach taken with the Microvax documentation seemed more oriented to the use of the equipment as your private CPU. It didn't address connecting multiple users in detail."

PUBLIC FINANCE SERVICE

Until two years ago, Public Finance Service, Inc. of Bala Cynwyd, Pa., a loan company specializing in personal loans and first and second mortgages, operated its 24 East Coast branch offices in an essentially manual mode.

The headquarters office did

own a Prime Computer, Inc. 2250 minicomputer configured for 800M bytes of memory, says Vice-President Jeffrey Gatter, but the branches had to make do with monthly reports generated on the central system and manual methods of calculating loan options, tracking payments and tallying transactions.

Since Public Finance Service provided the branch offices with a total of 35 hard-disk-equipped DEC Rainbow 100s and a mixture of DEC's LA509 and LA210 printers, however, operations have become both highly automated and a good deal more accurate.

"Before, we were averaging 400 to 500 calculation errors a month," Gatter says. "Now we might get five or six."

The selection of the Rainbow as the vehicle for branch automation was fairly simple, Gatter says. The company knew it wanted microcomputers with a major vendor name behind them.

"Two years ago," he says, "that really only gave us three choices — Apple Computer, Inc., IBM or DEC."

Of those three, he adds, DEC was the only manufacturer offering on-site support, a major purchase consideration given the far-flung locations of the branch offices.



"If we had a computer break down in Palatka, Fla., we wanted to know that someone would come out to fix it," according to Gatter.

An in-house programming staff created the software that allows branches to use their Rainbows for calculation of loan terms, based upon length of contract and type of guarantee; for tracking of interest, fees and payments on all loans; and for special reports on payment records or payment performance based on different variables.

The only commercial software that is being used in connection with the Rainbows is a C-Basic compiler from Digital Research, Inc. and Post Plus, a data communications program from MC Tel, Inc. This program is used with 1,200 bit/sec. Hayes Microcomputer Products, Inc. Smartcom or Popcorn modems.

Daily reports on all transactions are fed back from each office to the central Prime computer via Western Union Corp.'s Easylink service as mailbox messages. And, when necessary, the central computer contacts separate offices in the same way, leaving messages for them in their individual mailboxes.

■ CONTINUED ON NEXT PAGE

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EXTRA

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Not only does the Western Union connection solve the protocol problem between the Prime and DEC equipment, Gatter says, it winds up being a very economical means for communicating with remote locations.

"I figure that it saves us what would be about \$30,000 a month in access charges, if we had to be on-line all the time," Gatter says. "This way, we are only billed per minute of logged-on time."

The central computer, which picks up messages amounting to between 8,000 and 10,000 transactions a day, obviously accumulates substantial logon time, according to Gatter, but usually the process does not take longer than five or 10 minutes from each of the offices.

There is only one problem on the

horizon for Public Finance Service, according to Gatter, and that is that some of the branches are beginning to outgrow their Rainbows. "We really need larger, multiuser-type systems in four or five of the offices," he says.

Gatter is seriously considering a migration to Microvax IIs for these offices, since, he says, "It seems like a good value in terms of price and performance."

Still, it's not a move that he enjoys contemplating because of the amount of work that will be involved in adapting the existing in-house software to both a different operating system and a multiuser environment.

"There's no getting around it," he says, "it would be a major overhaul. Once you get into the VAX line, I'm told migration is fairly easy. But from where we stand, it would be a very big job."

AMERICAN CYANAMID

Availability of prepackaged software for technical computing and management provides a strong incentive for the use of DEC hardware in a setting like the Chemical Research Division of American Cyanamid Corp. in Stamford, Conn.

"A lot of the packages that we need for technical computing and management have really grown up within the DEC environment, starting with the PDP series and then migrating to the VAXs," according to Rudi Potenzzone, American Cyanamid information systems manager.

"There is just better software available to run on the VAX for tasks like statistical analysis, modeling, technical

word processing and data collection than there is for any other system," Potenzzone says.

If this software edge was important before, it has become even more so in recent times, according to Potenzzone, because staffing for development and maintenance of software for approximately 320 active users has just become too costly.

"We are purchasing more and more of our applications these days," Potenzzone says, "because if there are any dollars available for hiring, we'd rather spend them on chemists than computer people."

The only real concentration of homebrewed programs within the division now, according to Potenzzone, consists of financial applications, which currently run on a VAX-11/750 and two Microvax IIs.

"We have to write those ourselves," he says, "because we have some unique requirements in terms of government reporting, and because there are so many restructurings and reorganizations going on here all the time."

All of the division's other systems — one VAX-11/785, one VAX 8200 and one Microvax — are used primarily for research-related activities, although, since all of the equipment is connected via Decnet, area managers can and do use the VAX-11/785 to retrieve monthly expense reports processed on the VAX-11/750.

The next step, according to Potenzzone, will be the installation of a VAX 8500 and cluster technology, which will provide much more experimental capability to the scientific users.

"What we want to be able to do," he says, "is provide the kind of interactive processing that will allow our scientific staff to play the same kinds of 'what-if' games that financial analysts do with spreadsheets."

When the cluster is installed sometime this fall, it will allow Potenzzone to expand a discovery of his own — the use of DEC's All-In-1 office automation package as an "application launcher."

Right now, All-In-1 is running only on the VAX-11/750, but on that machine, it is serving as a kind of universal applications interface and organizer.

"All of the software that we purchase for the 750 is put up under All-In-1," Potenzzone says. "In a few instances, we've done some extra work to make it possible for users to actually send messages while using another application, but mostly it is a matter of simply putting the applications into the All-In-1 menu so that users don't have to try to remember commands."

Potenzzone is very enthusiastic about the way that this use of All-In-1 reduces the amount of training needed by inexperienced users, even though working with the software has not always been easy.

"Version 1.0 had a lot of problems and quite a few bugs survived into Version 2.0," he says. "Unfortunately, the local offices usually don't seem to know anything about these problems or how to fix them."

"So rather than hire expensive DEC consultants who may or may not know what the trouble is, I've wound up finding and fixing a lot of them myself."

"It's very convenient to buy international media through CW International Marketing Services. Their centralized services are excellent."

Hercules, a California manufacturer of monochrome and color graphics cards for the IBM PC and compatibles, is successfully marketing its products abroad. As the first company to establish high-resolution graphics cards, Hercules entered untapped European markets even before it began selling domestically.

Susan Saul, International Sales Manager for Hercules, relies on CW International Marketing Services to place her advertising and even recommend suitable distributors for the Hercules product line.

"CW International Marketing Services provides me with incredibly helpful market information," says Susan. "CW's contacts know the international markets quite well. In fact, CW has even recommended distributors in Third World countries," she explains.

According to Susan, CW International Marketing Services has made her job easier. "It could be difficult dealing with foreign publications because of time and language differences, especially when placing ads in 10 different countries. It's very convenient to buy my international media through an agent in Boston. CW's centralized services are excellent."

And, since Hercules runs schedules in multiple CW publications, Susan enjoys corporate discount rates. "And," she adds, "I don't have to pay the value-added tax. That is a major factor."

While launching the Hercules Graphics Card Plus, a new technology which offers the flexibility of graphics with the speed of text, Susan plans to continue advertising with CW International Marketing Services. She explains, "In our media analysis, CW publications consistently rank high in terms of editorial quality and market position. CW International Marketing Services is working for us."

To find out how CW International Marketing Services can work for you, call Frank Cutitta, Managing Director, 800-343-6474 (in Massachusetts, 617-879-0700).



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EXTRA

NATIONAL RADIO
ASTRONOMY
OBSERVATORY

Some 80 educational institutions worldwide rely on astronomical imaging software produced by the National Radio Astronomy Observatory using DEC VAXs and other superminicomputers.

Headquartered in Charlottesville, Va., the observatory's scientists developed the Astronomical Imaging Processing System (AIPS), which runs under Unix and DEC's VMS operating system. AIPS, a very large program, processes data gathered from a telescope and produces astronomical images.

The organization acquired the DEC equipment so that it could make AIPS available to universities, many of which have VAX computers, according to Gene Runion, the observatory's technical specialist.

"Once we were able to transport the code for AIPS to the VAX, we were able to port our code to other universities instead of having them come here and use all of our CPU time," Runion says.

At the Charlottesville headquarters, a VAX-11/780 operates on an Ethernet network with an interface developed by Exelan, Inc. A Floating Point Systems, Inc. Model 120B array processor works with the VAX to increase its number-crunching power, and both systems work with an image display processor, made by International Imaging Systems, Inc.

Acquired in 1977, the VAX replaced a Modular Computer Systems, Inc. minicomputer, which was used to develop the original AIPS program. Like the VAX, the Modcomp computer worked with an array processor and an image processor.

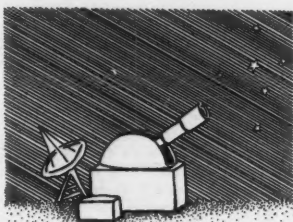
Running at the same site is a Convex, Inc. Unix-based C1 superminicomputer. Acquired last December, the Convex system replaced an IBM 4341 that was proving too cumbersome.

When it was acquired nine years ago, the VAX was seen as a powerful machine for the price, but now the observatory is considering acquiring more Convex machines because they out-perform the DEC equipment, Runion says.

"Overall, the VAX is a good machine, but if there are two or three users running AIPS, then it becomes extremely slow. The program just takes a lot of resources. That's why we've got this Convex computer. We've been satisfied with the VAX, we just wish it had more horsepower," he says.

The essential difference between the VAX and the Convex system is that to run AIPS, the VAX must have an imaging system as well as an array processor working with it to provide sufficient processing power. On the other hand, the Convex requires only an imaging system. Its compiler automatically vectorizes Fortran code, giving the computer the increased horsepower of an array processor.

Despite concerns about the VAX's future at the observatory, models are also installed at the organization's remote sites. For example, the VAX in Charlottesville communicates over Decnet with three VAX-11/780s at an observatory site in Socorro, N.M., and with two 11/750s at a site in Tucson, Ariz. In Socorro, there is also a Decsystem-10 and a variety of PDP-11s. These remote locations also run AIPS as well as programs that control the operation of telescopes and antennae to collect astronomical data.



In addition, the observatory's equipment is connected to a Cray Research, Inc. supercomputer at Digital Productions, Inc. in a project sponsored by the National Science Foundation. An experiment to see if AIPS can run on the Cray, the connection may give the observatory more processing power to obtain better astronomical images.

ARKANSAS GAZETTE

The Arkansas Gazette Co. in Little Rock, Ark., publisher of "the oldest newspaper west of the Mississippi," has been a DEC shop from end to end since the fall of 1983, when it replaced the IBM 3400 and 3800 machines that had been running the business office with the first of two VAX-11/780s.

The decision had little to do with brand loyalty, according to Riley Suit, manager of information systems.

DEC moved in on the strength of its third-party software backing. "All of the software that was running on the IBM equipment was internally developed," Suit says, "and it was becoming more and more expensive to maintain as the applications continued to grow." With nine or 10 DP staff members already dedicated to program development and

maintenance and with substantial expansions projected, the firm decided to look for packaged software.

Very little, if any, newspaper management software existed for IBM mainframes, Suit says. DEC, on the other hand, had gained an early lead in the publishing industry, and software providers had followed up with business packages. "There's probably more newspaper-specific software written for DEC equipment than for any other kind of system," Suit says.

The package that the company chose to handle front-office functions — including accounting, circulation, advertising layouts and personnel records — was produced by Collier-Jackson, Inc. in two versions — one for DEC and one for Hewlett-Packard Co. Because DEC

■ CONTINUED ON NEXT PAGE

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EXTRA

■ CONTINUED FROM PAGE 69 and DEC-compatible equipment already dominated the newsroom and production areas, Suit says, the choice was obvious.

Since switching to commercial software, system staff costs dropped substantially, according to Suit. Where once there were nine support people dedicated to the business systems, now there are three.

With the installation of a second VAX-11/780 a year and a half ago, linked to the first via DEC's Ethernet local-area network (LAN), a significant hardware benefit also emerged.

"DEC's connectability has already given us an important measure of security," Suit says. "The way we have the equipment configured, we can, if necessary, switch all of the work over to one machine and get it out without interrup-

tion." Two linked VAXs cannot quite match the fault tolerance of a system like Tandem Computers, Inc.'s, he says, "but we are effectively using them that way."

To date, the Ethernet LAN has only been used to connect the two VAX-11/780s to each other and to two PDP-11/70s in the newsroom running DEC's Classified Management System software as well as its Text Management System package. The next step, Suit says, is to extend the link to the 50 or 60 VT100 and VT220 terminals that are currently tied into the VAXs with conventional cabling.

"We're moving slowly," he explains, "because we have to consider the availability of technical staff. Newspapers are somewhat unique in that they tend to do a lot of their own hardware maintenance, and we're no exception."

J. R. SIMPLOT

The J. R. Simplot Co., a privately held agribusiness in Boise, Idaho, has attempted some ambitious things with its 225 DEC Rainbows, using them for inventory control, for running soil tests in its retail fertilizer outlets and for front-end communications with Wang Laboratories, Inc. word processors and Compugraphic Corp. typesetting equipment.

But most likely, nothing Simplot has

ever done with this equipment has been harder, says microcomputer specialist and systems programmer Brian Orr, than the ongoing task of trying to find software to run on it.

"The machine itself is very well designed, but gets next to no support from DEC," Orr says. He points to the difficulty of obtaining updates on popular commercial packages like Ashton-Tate's Dbase III and Lotus Development Corp.'s 1-2-3. "We're still working with Version 1.0 of Dbase III," he says, "and although Version 2.0 of Lotus has been available on the IBM Personal Computer for over a year now, we've only recently managed to get DEC to promise an upgrade for the Rainbow by sometime



this fall."

What is even more frustrating than being kept waiting for — or even deprived altogether of — third-party software products developed for IBM-compatible personal computers, Orr says, is being snubbed by DEC on one of its own developments. "What really frosted me," he explains, "was to have DEC come out with a version of Decnet for the IBM PC before it produced a version for the Rainbow."

For a company with two Decsystem-20s, one VAX 8600, one VAX-11/785, two VAX-11/750s and more than 200 Rainbows to be placed in the position of having fewer micro-to-mainframe communications options than if it had IBM PCs was the final straw, Orr says. Simplot decided to pursue a gradual shift to the AT&T 6300 at the microcomputer level.

AT&T seemed to field a service organization capable of providing support equivalent to what the company had been getting from DEC, according to Orr. Even more important in light of past experience, he adds, "As far as we can tell, the 6300 is almost 100% IBM compatible, which means that we can run any programs for IBM and IBM-compatible machines straight from the box."

Orr, who is an active member of the PC special interest group of the Digital Equipment Computer Users Society, has listened with interest to preannouncement talk about DEC's Vaxmate PC product. However, nothing that either Orr or his boss, who attended a nondisclosure meeting held by DEC concerning the product, heard convinces them to change their minds about moving to the 6300. "It [Vaxmate] is supposed to be very fast in communication with a VAX," Orr says, "but we still think that PCs with Ethernet boards look better."

Simplot is also concerned about expandability in its stand-alone machines. According to Orr, Vaxmate is intended to take computing in another direction. "There are only going to be two card slots in the new machine," he says, and "if you want to attach a hard disk, you will have to buy a \$2,500 expansion box. What I think DEC is trying to do is move away from the concept of stand-alone computing and push for the use of the mainframe as a memory device."

That is not only an expensive way to go, Orr says, it is also antithetical to the way Simplot wants to use PC-level equipment.

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BANKERS TRUST

For Bankers Trust Co. in New York, one of the country's 10 largest financial institutions, there are only two brands of equipment that fit the bill for all data processing needs: IBM and DEC.

With IBM mainframes dominating the host environment, Bankers Trust chose DEC PDP-11/70s and a wide range of VAXs to fulfill worldwide processing requirements and provide a high degree of systems connectivity.

"We have systems in Hong Kong; Frankfurt; Sydney, Australia; and London," says Stanley Rose, vice-president for distributed processing technical support. "We were looking for a vendor with a strong presence in those sites and one that had a track record. In 1976, when we chose it, the PDP-11/70 was

almost the system of choice for money transfer systems. It was a natural evolution from there to move onto the



VAX."

Recently, Bankers Trust added Vaxclusters to its configuration and found them very amenable to the upgrading of equipment, which is the current focus of the company's information systems expansion.

"It has been exceedingly simple, once a project is clustered, to add a CPU. You swap out an 11/780 and plug in an 8600 — you could do that overnight, and it's transparent to the application," Rose says.

Although there was some concern a year ago over DEC's lack of new product announcements, Bankers Trust is now very satisfied with the level of integration offered by the product line.

"There was a lot of time when it appeared there was not a lot of progress going on in the '83 to '85 time frame. It seemed like things were stagnant, but then all of a sudden there is this burst of delivery of new products," Rose says.

The slowdown in DEC's product introductions forced Bankers Trust to look hard at its systems and consider other options.

"We had moments when we would have liked there to be some upward growth path. We had some systems that were hitting the ceiling. The cluster was not released yet, and we were trying to increase the capacity," Rose says.

"It also had a good effect on us because instead of taking the easy route out and just putting in a bigger processor, we went back and redesigned the application. It was painful, but we ended up with a much more efficient application as a result," Rose adds.

Bankers Trust's configuration includes 18 PDP-11/70s and 41 VAXs — eight 8600s, five 11/785s, 12 11/780s, eight 11/750s, two 11/730s and six Microvax IIs.

The bulk of the equipment runs in the company's Manhattan data center, with a comparable backup installation being developed in New Jersey. The Microvax IIs are installed at diverse user locations.

All the systems connect via Decnet either on a production network or a development network. Additional DEC equipment located at international sites can communicate via Decnet with the New York-based hardware.

All the DEC systems are connected to the IBM complex, which includes two 3033s, two 3081s, and two 3090 Model 180s. There are two IBM-DEC communications links: DEC's Decnet SNA Gateway for terminal emulation and

task-to-task communications and Interlink, Inc.'s 3711, for high-speed file transfer.

With the 3711 system, the IBM hardware appears as a Decnet node to the DEC equipment, and conversely, the DEC system looks like a remote IBM data set to the IBM complex.

Key to the company's balance of IBM and DEC equipment, the Interlink product allows data transfer to the point where Datatrieve can be run on a DEC system against an IBM data base.

A list of the software on the systems reads like a DEC software catalog. Rose says, "The bank's goal is to use DEC products where available. We feel that it's better in the long run to avoid niche products that may supply an expedient solution today but in the long run do not integrate well with the other products."

Bankers Trust runs its own communications backbone based on an X.25 network, and the company uses DEC's Packet Switch Interconnect software to interconnect the systems.

Money transfer is one of two major applications on the systems. This electronic funds transfer system connects Bankers Trust to the Federal Reserve Bank clearinghouse and several wire services. The system has handled on-line transfers in excess of \$120 billion a day.

The front end to the money transfer system is a cash management system, called Cash Connector, which allows corporate financial officers to obtain on-line access to their accounts and to initiate activities on-line.

For example, the officers can initiate a money transfer or move money from one account into another. The system enables them to check on their balances and determine whether funds have been transferred into or out of their accounts.

A second major application is used by 300 traders in the bank's Resources Management Department. This application system allows on-line processing of security, bond and foreign exchange transactions.

The cluster is moving us in the direction of fault-resistant systems, and there are still some places that I'd like to see more redundancy built up.

— Stanley Rose
Bankers Trust Co.

For the future, Bankers Trust is continuing to upgrade its equipment and looking to DEC for improvements in hardware redundancy.

"The cluster is moving us in the direction of fault-resistant systems, and there are still some places that I'd like to see more redundancy built up," Rose says. "For example, there's automatic fail over, but it doesn't take the application and copy it over."

"DEC says that most of the problems are applications and not hardware, but we still have hardware failures, especially on the front end of Ethernet. What they've said is if there's enough demand for it, they'll look at implementing some of these things."

Goal: 30-second service

The hardware announcements garner most of the attention in the press, but it is DEC's service organization that creates the most interest among DEC's customers. With complex networking systems and a spate of new machines invading customer sites, service people interact with users more than any other DEC representative.

The profit-making service machinery accounted for \$2.5 billion in revenue and a significant portion of the company's profits last year. About 30,000 — or nearly one out of three — DEC employees is involved in training, consultation and service.

The idea of using service as a source of revenue began at DEC 25 years ago. Then an unheard-of practice in the industry, it is commonplace now.

"Customers want good service, and they are willing to pay for it," says David Grainger, DEC's corporate field service vice-president. Service, in fact, is a major growth area in the computer business.

Incorporating its own technology into a massive support network, DEC's remote diagnosis centers allow customers' computers to dial into a site to diagnose the problem. A customer calls an 800 number to hook into one of DEC's 12 centers. A diagnostic data base automatically examines the problem and recommends a solution or

dispatches a technician to the site.

The remote service approach allows DEC to concentrate expert resources in central locations rather than spread them around the country where only a few customers would benefit. This year, the total number of problems solved by the remote diagnostic centers will exceed for the first time the number solved on customer sites. DEC now employs several thousand service experts at its centers and plans to invest more than \$1 billion in remote services over the next five years.

"We operate on an average speed per answer basis," Grainger explains. "The goal is get the customer a correct response or connected to the right person within 30 seconds. We've actually been coming in at 20 seconds."

For 15 years, DEC has followed up its service with an evaluation form sent to every DEC customer. DEC has made steady improvement since 1981, when, on a zero to 10 scale, the company consistently scored sevens. Today, based on 250,000 responses, service received an average mark of 8.8, a rating "supported by other independent surveys," Grainger insists.

For Grainger, the challenge is to maintain or improve the high marks. "Satisfied customers come back again and again," he says.

— Glenn Rifkin

BECHTEL

At Bechtel Corp.'s Western Power Corp. division, which handles power plant construction projects in the West, a freshly acquired Vaxcluster for computer-aided engineering had barely emerged from intensive preproduction testing when new product announcements from DEC took the shine off the purchase.

"We had only been using the cluster for three or four months when I saw a DEC ad for a new cluster controller, the HSC 70, that is supposed to be twice as fast as the HSC 50s we had just purchased," says Malcolm Chou, production services manager.

Recognizing that the new releases made the cluster purchased the previous summer if not exactly obsolete then certainly a distant second best, Chou went to DEC, advertisement in hand, and inquired about the possibility of a trade-in.

"They said, 'No,' they would continue to support the equipment that we had purchased, but they weren't offering any trades," Chou recalls. Then, he says, the vendor suggested that Western Power might want to consider upgrading to the new equipment. Chou understands that "business is business," and it is natural for a vendor to want to move existing stocks before starting to sell products that have not yet rolled out the door.

There wasn't so much of a rush to implement a cluster that the company couldn't have waited until April to buy, Chou says. The only absolute need at the time was for a VAX-11/785 to take some of the burden off an existing VAX-11/780 that was beginning to experience serious performance degradation. "We could have ordered the 11/750 then," Chou says, "and waited on the cluster. If they had just told us, we would have listened."

Somewhat disillusioned, but wiser, Western Power now seeks other sources of intelligence. Based on grapevine murmurings about a new and improved DEC server, the company postponed its planned purchase of several more Decserver 200s.

Despite its quick loss of state-of-the-art status, Western Power's cluster performs well and smoothly. The two VAXs, with a combined 24M bytes of memory and clustered with two HSC 50 mass storage controllers, support an average of 40 users at any given time through either one of 20 directly connected terminals or an Ethernet local-area network.

The clustered system, according to Chou, handles a work load of programming development, engineering calculation, engineering administration and word processing about 20% higher than the amount that stressed the single VAX-11/780 beyond tolerance last summer. Response time has not reached the programmers' ideal of instantaneous, but Chou doubts that is achievable.

Transition from the single machine to the clustered configuration has been extremely smooth, according to Chou. But, he adds, that is mostly because every aspect of the system was intensively tested before being released to users. System support supervisor Forrest Laurano and his staff spent three months making sure that all of Western's many application packages and productivity tools adapted properly to the new environment and operating system.

Before the testing period was over, users had started to become restive. But, says Chou, that kind of pressure is something that anyone implementing a first-time cluster would do well to ignore. "You don't just bring in a system like this and release it for production," he says, "unless you are prepared to run into problems of every conceivable sort."

EXTRA

A. C. NIELSEN

When A. C. Nielsen Co.'s Media Research Group in Dunedin, Fla., received its first version of DEC's All-In-1 along with its first VAX-11/750 in 1983, the reaction was disappointment. "That initial version just wasn't as good as we had expected," says Joseph Whatley, manager of data collection computer services. "The documentation was terrible, almost impossible to understand, and it was very difficult to customize."

Given these drawbacks, the Media Research Group might have given up on All-In-1 entirely at the end of its 30-day trial period, except for one thing. "The primary reason we kept it," Whatley says, "was that we discovered we could develop user applications faster in All-In-1 than we could in PL/I or Fortran."

Despite what Whatley terms "a steep learning curve," the programming staff managed to shave 4% to 5% off programming time during the year and a half before DEC came out with a new and improved version of All-In-1.

The multiplication of user application requirements — and the inability to satisfy them when increasing amounts of system capability were being claimed for the collection of overnight ratings data — had prompted the initial decision to move office and production applications off a shared PDP-11/84 and onto a separate VAX machine. So any small improvement in programming efficiency was welcome.

It wasn't until the second version of the software appeared, however, that All-In-1's full potential as an application

development vehicle could be realized. With documentation that was "at least 10 times better," according to Whatley, and much improved functionality, programmers were able to forge ahead on the creation of applications. These ranged from a document format system that allowed the personnel section to fill in forms on the screen — rather than create them using electronic typewriters — to a work request system for Whatley's own department that permits users to track the progress of projects they have requested through screen updates instead of interruptive phone calls.

At this stage, Whatley estimates, savings in programmer time from the use of All-In-1 has jumped from the earlier maximum of 5% to an average somewhere between 5% and 15%. The systems staff also uses DEC's Datatrieve to perform many of the system management functions of All-In-1.

The only disadvantage to the ease with which All-In-1 adapts itself to applications development, according to Whatley, is that it uses up a lot of system resources. "If you use it to reduce programming time and maintenance, you also decrease the number of users that you can support on the system," he says.

Right now, although there are 250 user accounts within the Media Research Group, the system — which has already grown from one VAX-11/750 to a clustered pair — can only support 32 users simultaneously. The numbers will soon improve, however, Whatley says.

INTERNATIONAL KINGS TABLE

International Kings Table, Inc., headquartered in Eugene, Wash., is trimming time and costs associated with cash management for its chain of 80 buffet restaurants. The tools it is using include an automated system consisting of three VTR 6050 terminals with telephone interface from Votan, Inc. and a PDP-11/84 running Total Database from Cincom Systems, Inc.

Cash management for the chain previously entailed both the use of a service bureau and a tangle of long-distance phone calls, according to Jim McConnell, data processing manager. "We were going through ADP Financial Information Services, Inc.," he says. "Each restaurant would call the service company to report daily deposits, sales and customer counts. Then the bank would go through them to get the information necessary to make cash transfers." Once a week, the service bureau produced detailed reports based on this daily input and shipped it to Kings Table via special delivery.

Then, on Sunday mornings, the second part of the information collection process would take place. Area managers would have to call individual restaurants to obtain weekly totals on food and labor costs and then report them to regional supervisors.

This system was both cumbersome and costly, McConnell says. Not only were supervisors getting fragmented and dated information, he says, but the company was paying dearly for this less-than-optimum intelligence. "Our phone costs were tremendous and the ADP processing was also very expensive, about \$2,500 a month."

Cost was the major reason, McConnell says, that the company decided to create its own automated reporting system for cash management, utilizing voice terminals hooked to its second PDP-11/84, delivered in May.

Since the beginning of June, restaurant managers have been able to make their daily and weekly deposits of information on sales, customer counts, costs and so on directly to the PDP-11/84 at company headquarters, using their telephone keypads to communicate with VTR 6050 voice terminals hooked into the processing machine. Instead of depending on week-end reports and a stream of weekend calls from area managers, supervisors can call in and obtain summaries processed on the PDP-11/84 and delivered in the form of recorded messages played back on cue by the Votan terminals.

Although the company expects to be fine-tuning this system for some time, the improvement has been marked enough for it to contemplate future enhancements. A next step, McConnell says, could be to equip regional supervisors with portable terminal and modem combinations. When the chain has expanded enough to require more call-handling equipment, he says, there may be a place for Dectalk in the mix.

Dectalk was not considered at the outset, according to McConnell, because its local consulting firm, Pacific Information Processors of Oregon, recommended the Votan product.

Randy McMillan, the on-site technician from the consulting firm who installed the equipment and created the programs that control the operation of the VTR 6050s and their interface with

the PDP-11/84, says that the initial recommendation was based on a presumption that may have been mistaken. "We understood," he says, "that Dectalk didn't handle the decoding of the Touch-Tones, so we didn't think it would work very well for data input. But then," he adds, "in the last catalog I saw, there was a caption indicating that it could."

Without any further information and never having seen a demonstration,



says McMillan, he can only guess at how Dectalk might perform in the cash management reporting system. "I'm not sure whether it would be able to work alone," he says. Probably, he says, it would be easier in some ways to set up for message delivery than the Votan, which requires "a whole set of messages and prompts" to achieve voice playback of the data summaries. But he cannot see it replacing the Votan equipment as an input system.

CIBA CORNING DIAGNOSTICS

Michael Olex, manager of electronic systems engineering at the Gilford Systems Division of Ciba Corning Diagnostics Corp. in Oberlin, Ohio, says he's caught in a gap between DEC and his third-party suppliers that he is not quite sure how to close.

It has been just about a year since Gilford, which produces embedded microprocessor controllers for Ciba Corning's medical and research instrumentation, shifted from a PDP-11/70 to a VAX-11/780 as the main engine for microprocessor software development. In that time, according to Olex, "DEC has gone through four versions of VMS."

That would not be a real problem, Olex says, if all of the updates went smoothly. Installing a new version normally takes about one man-day, he estimates, which works out to between \$200 and \$500 worth of time.

Unfortunately, because Gilford is a heavy user of third-party software development tools and third-party vendors do not seem to be keeping pace with DEC's release schedule, updates are seldom smooth.

As an example, Olex cites the difficulty that Gilford ran into with the communications between Intel Corp. microprocessor equipment and the VAX after replacing VMS 4.3 with VMS 4.4.

"We use a Digital Ethernet Unibus Adapter board for the Ethernet link that allows the Intel systems to communicate to the VAX over a high-speed line," he says.

"It worked just fine until we went to the new version, but then the network simply wouldn't come up," Olex says.

As a result of this software incompatibility, Olex and his staff had to pull out the new version of the operating system that they had just spent part of the weekend installing, and they will have to repeat the upgrade again — as soon as Intel resolves the problem.

This is not, Olex emphasizes, an isolated instance. Gilford has run into

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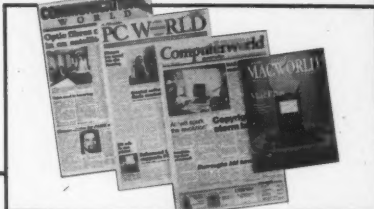
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either outright incompatibility or bugs in new releases on software development tools from other suppliers like Microtech, Inc. and Systems & Software, Inc. as well. Given the experiences to date, he says, the division will probably have to rethink its policy of trying to keep up with DEC.

"A lot of the changes that are made from version to version of the operating system software are actually pretty transparent to the user," he says. "There were a couple of nice additions in VMS 4.4, like an allowance for some conditional statements in Digital Command Language commands, but nothing that was really all that crucial for us."

In fact, according to Olex, the only reason that Gilford has been trying so hard to keep current is that DEC, like many vendors, has a policy of discontinuing support on older versions after a certain number of months. "After that, if you call them up about a problem, they'll say, 'Oh? That's interesting. Why don't you consider bringing in our new version?'"

Olex is not quite sure what the interval before cutoff support really is — somewhere between three and six months, he says — but he's beginning to believe that Gilford will have to resign itself to lagging at least three months behind DEC in the adoption of new versions.

"It will cut down our margin of safety on support," he says, "but, given what has happened in the past, we may be better off waiting."

ALCOA

DEC's decision to discontinue the Decsystem-10 family of processors in favor of the VAX line is causing some anguish for users at the Aluminum Company of America (Alcoa) Laboratories in Alcoa Center, Pa.

The Alcoa computer department warned the site's approximately 1,000 users that in March 1987, their familiar Decsystem-10 will be unplugged and replaced by new, unfamiliar VAX computers.

"The people at this particular location are pretty independent," according to Joe Watson, supervisor of computer facilities. "Some of them will go, and some of them will be kicking and screaming at the eleventh hour, because you're taking something they know and replacing it with something they don't know."

In fact, the computer department itself was surprised that such a drastic change would have to be made.

"I expected to go to a users group meeting and hear them announce a new Decsystem-10," Watson says. "About two weeks before the meeting, our local DEC sales people came out to prepare us that it wasn't coming out."

"We had plans to plug in the next generation of Decsystem-10s. We had been very satisfied with the product, because it is reasonably easy to use. We, along with a lot of other people, were surprised when they decided not to come out with the next generation. We didn't exactly go kicking and screaming into a VAX world, but it was sort of like if we wanted to stay in the DEC line we were directed there. We didn't have much of a choice."

According to Watson, this unexpected strategy change affected the close relationship DEC had with its users.

"A lot of other people were more

upset than we were. Some people felt the rug had been pulled out from under them," he says.

"I have been using DEC's equipment for a long time, and they were at one time very, very user-oriented. I've seen

Their public image now is much more Madison Avenue. They used to be more folksy, and now they're second in the world in making computers.

— Joe Watson
Alcoa Corp.

software products come out of the user community — especially the universities — and DEC would say, 'Hey, that's the product. It's better than what we've got and we'll support it.' They seemed to have no reservations about it. Talk about a user-friendly company — they were very willing to work with the users. There was a nice relationship there and their decision to discontinue the Decsystem-10 surprised the users and made many of them angry," Watson says.

Alcoa bought its first System 10 in 1973. The company went from a KA processor to a KL, which was the last processor sold for the system. In addition, the company runs seven VAXs, including 11/750s, 11/780s and two 8600s, and five PDP 11s. An IBM Systems Network Architecture Gateway connects the DEC systems with an IBM 3084 at its Pittsburgh headquarters.

Located about 35 miles from Pittsburgh, Alcoa's research facility is a 2,200-acre campus-style complex. The company uses TRW, Inc.'s LAN local-area network, Decnet and Ethernet to connect the systems within the campus.

Applications include materials research with statistical analysis, graphics and mathematics software.

In Watson's own view, the change in relationship between DEC and its users may have been the inevitable result of the company's rapid growth. "I don't know if they could have continued in the same style as the old days. When I first started going to the users group meetings, the head of their systems software development would be there with his hair tied back in a pigtail. You don't see that anymore," Watson says.

"Their public image now is much more of a Madison Avenue image. They've gone through a grand growth, where they used to be more folksy, and now they're second in the world in making computers. I don't know if they could have stayed folksy."

"I think they still have good products, but they've suffered from the growth in the user area. They still seem to show up with top-of-the-line product people at the users meetings, and if you bought a software product from them and you want to find the developer, you can go to a meeting and they will be available to you. But I don't know that they are as formed by user input as they used to be. I think they're being directed more by corporate policies these days," he adds.

DEC shifts marketing focus

Marketing has long been an enigma at DEC. Consultants and the media consistently berate the company for its lack of marketing savvy. Engineers, they say, do not understand marketing, and selling outside of the scientific/engineering wellspring of DEC customers is a tough, even impossible, task for the company.

DEC officials, ever defensive about its label, counter that the company could not very well have reached its status as No. 2 in the industry without a solid marketing effort. Ken Olsen says that the discrepancy in viewpoint is a matter of perspective.

"The ultimate marketer, the great success in marketing in this world is to sell a product the customer doesn't need or want and which is less than the best," Olsen says. "And when people say we're not marketing oriented, they really mean that. And we don't share that view at all. So in that area, I will always be naive in the eyes of the world."

In fact, insiders at DEC mirror the outside view. Those on the engineering side believe the company has done a fantastic marketing job, while the marketing and sales people feel that a change in focus was long overdue.

Robert Hughes, vice-president of industry services marketing, is currently overseeing that change. The company is refocusing its marketing and sales efforts toward specific vertical markets, a shift away from its product-oriented marketing of the past.

Hughes is quick to point out that the shift in focus is nothing more than a logical evolution of a company getting more and more customer oriented. It is not, he insists, a response to criticism or outside pressure. Sources close to the company observe that Hughes' view may be oversimplified; it is possible that political infighting over the change in focus was heavy.

"The plain and simple reason we are doing it is we think it's going to help us double market share," Hughes says. "Over the last couple of years, as we thought about what it took to compete effectively in the '90s, it became clear to us that you need an additive function in marketing besides base products — you need customer focus."

To that end, Hughes' group narrowed down the world's businesses into 60 industries. From those industries came a group of sectors: government, services and basic industries. Within those sectors, groups were broken out, such as the media group, financial services and utilities.

Through consistent winnowing, Hughes mapped strategies for applications, channels and sales and then set about organizing the marketing and sales forces around that. Initially, he plans to focus on markets in which DEC already maintains a strong presence, such as aerospace, education, newspapers or chemicals, and spread its influence throughout more of each organization.

Realizing that DEC's engineering-oriented sales force was in over its head in many of these commercial markets, Hughes initiated a mammoth recruiting drive for industry sales representatives.

The sales force, both new members



Robert Hughes

and old, is undergoing extensive training built around vertical markets. Hughes acknowledges it is difficult to find the kind of people who can sell in that environment, but he points out that DEC is being very selective about who it is hiring.

Hughes adamantly adheres to the belief that the battle between DEC and IBM is an invention of the press — "a war that doesn't even have to happen." Sooner or later, he points out, customers are going to rewrite their applications to take advantage of new technology. "Their investment in IBM is only as good as the operating system they're using," Hughes says. "And if IBM comes out with yet another operating system or a different way of computing or networking, it just seems logical that [a customer] would say, 'Let's see what alternatives I have.'"

"So we're not saying let's replace their mainframe. That doesn't make sense. But we will offer a competitive advantage to clients who want to use our architecture. If they want to rewrite their application to take advantage of that architecture, we want to be part of that process," Hughes says.

Hughes will admit that DEC faces a tough challenge selling against IBM because many MIS executives hold the belief that DEC is simply a smaller version of Big Blue. "We haven't done a good job getting that message across in the past," Hughes admits. He says that convincing MIS of a DEC advantage depends primarily on who the customer is. "You talk to an MIS vice-president in a deregulated industry who has learned suddenly that he is no longer an expense center but a profit center. He has learned about the need to decentralize data and operations to remain alive, and he's a convert," Hughes states. "He says, 'Now I understand.'"

"But you talk to an old-line MIS manager in a company that's hierarchically operated, and they don't understand. To them, the IBM approach is perfectly logical."

Hughes says that the industry marketing approach will not only work but be transparent to the customer. He is personally frustrated that the installation of the philosophy has taken so long, but he is confident that its effect will be felt immediately. He is also convinced that in five years, the concept can be scrapped.

"By then, if it works, we can go back to the way we were organized, because people will understand customers better, and we will have such a presence in industries that you won't need this focus," he insists.

— Glenn Rifkin

EXTRA

WALKER ASSOCIATES

In the last year, Walker Associates, Inc. of Los Angeles, an architecture and interior design firm, has spent a lot of time patching and shoring up an unsupported computer-aided drafting and design (CADD) system.

Three years ago, the firm invested about \$250,000 in the system, which consists of a VAX-11/750, DEC VT100 alphanumeric terminals, Lexidata Corp. graphics terminals and a software package called Tri-CAD, produced by a vendor of the same name, Tri-CAD, Inc., in Milpitas, Calif. — a vendor that no longer exists.

It was the demise of the software vendor that created Walker Associates' current dilemma, according to David Leckie, director of information systems. "Tri-CAD was acquired by another company, Autotrol Technology Corp.," Leckie says, "and that company decided it would discontinue the DEC version and stop supporting it."

This decision by Tri-CAD's new Denver-based owners left Walker with a limited set of options. The firm could write off its initial investment and a data base of drawings and specifications worth at least as much and start from scratch with a whole new system.

It could try to find another vendor whose software would run under VMS and who either utilized Lexidata terminals or would agree to swap them out for the required models.

Then there was the final alternative: Continue to use the existing software, without a safety net, and try to recoup as much of the original investment as possible. The first alternative was both economically and operationally impractical, Leckie says.

The second choice just hasn't materialized. "It wouldn't be all that difficult to find a software manufacturer with a package that runs on VMS," Leckie explains, "but unfortunately, ours is a case of having both unsupported software and nonstandard peripherals."

Walker has been reduced, therefore, to waiting and watching the market and "trying to use the current system, essentially, until it drops," according to Leckie.

As a conservation measure, against a day when "the software system might collapse in a smoking heap," Leckie has installed an IBM Personal Computer-based CADD system, Autocad, made by Autodesk, Inc., of Sausalito, Calif.

It took about three man-months of programming effort to produce software that would translate and transfer design data from the VAX-11/750 to the Autocad system, he says, and the result is a partial solution at best.

Still, any backup is welcome, since without source code Leckie cannot really patch up Tri-CAD in the traditional sense.

"I can't solve anything from a programming standpoint," he says. "I have to try to patch up jobs from the data side, figuring out alternative ways of recording information or sometimes, if a bug develops in the middle of a session, deleting everything and rebooting."

WIENER ENTERPRISE

Wiener Enterprise, Inc., located in Harahan, La., a suburb of New Orleans, is holding firm with its Decsystem-20, despite high maintenance costs and a growing inventory of in-house programs that will eventually need to be converted.

"I know that in some ways we are digging ourselves a hole here," says Steve Attaya, director of information systems for the diversified retailer of menswear, footwear and popularly priced apparel.

According to Attaya, "The more code we write on this system, the more we're going to have to convert, and we're already up to about 50 active programs."

But, Attaya explains, although the company considered replacing its 1977-vintage equipment in 1983, when DEC announced it would be discontinuing the Decsystem-20, it was hard to justify such an investment at a time when business was suffering from an economic downturn.

"In 1982 and 1983, we lost money and went from 148 stores down to 81," he says.

Four states in which Wiener stores are located — Texas, Louisiana, Arkansas and Mississippi — are among the most severely affected by oil price drops.

Although business has improved, with the number of stores climbing back to 115 and net earnings reaching just under \$2 million last year on sales of \$58 million, Attaya still maintains a wait-and-see position. When the company began to run out of memory and experienced response-time erosion late last year, for example, it chose to upgrade rather than invest in new equipment.

At one time or another over the past couple of years, Attaya says, he has looked at equipment from Burroughs Corp., Xerox Corp. and Honeywell, Inc. as well as IBM's 370. Nothing, so far, has convinced him to take the step.

"One of the things that would probably make me move," Attaya says, "would be if someone came out with a software package that fit this business."

There are packages for clothing manufacturers and packages for small retailers, but so far nothing — at least in an affordable price range — written for a retailer of Wiener's size.

If the truth be told, Attaya is not all that anxious to make a switch from the existing equipment, although he knows such a move makes sense.

"The Decsystem-20 has always been great for development," he says. "It has a wonderful operating system in terms of user friendliness, which has meant that we've been able to operate with a significantly reduced staff in terms of both quantity and quality."

In fact, Attaya says, the only thing preventing him from simply hooking another Decsystem-20 to the original and staying put is the expectation of escalating maintenance costs.

"At the time of its announcement, DEC said it wouldn't change its maintenance prices for three years, and that's just about where we are now."

STANFORD

At Stanford University's Low Overhead Time-Sharing System (LOTS) Computer Facility in Stanford, Calif., the task of supporting academic computing includes providing users with continuing access to an operating system they have come to know and like.

This is why the facility chose not to migrate entirely from the 36-bit world when DEC announced its intention to discontinue the Decsystem-20 line, according to the facility's director, Ralph Gorin. "We feel that it is our job to provide users with access to 36-bit machines for as long as they want it."

This demand is expected to taper off somewhat as social scientists seek out the larger capacity of the center's year-old IBM 4381 for statistical analysis work and the majority of new software development shifts toward programs for its two VAX-11/780s and one VAX 8650.

Still, Gorin says, loyalty to DEC's TOPS operating system was strong enough to necessitate something more than simple preservation of the three existing Decsystem-2065s.

LOTS found that something in the SC-30 from Systems Concepts, Inc. in San Francisco. Designed as a response to DEC's decision to discontinue development in its 36-bit line, the SC-30, according to Gorin, is a Decsystem-20 look-alike that not only runs TOPS, but is two or 2½ times faster than a Decsystem-2065 and occupies only about one-sixth the space.

Gorin, who started working with a prototype of the newly available SC-30 last fall, notes that all of the existing application programs could run on the system without modification. "About the only differences," he says, "are that the I/O drivers can be changed to suit your particular needs, which, in our case, meant accommodating some IBM channel peripherals; also, the system is capable of supporting eight million words, about four million more than can be handled by TOPS." That disparity can be a bit of a problem, Gorin says, but Systems Concepts is working on the operating system to resolve the gap.

There is more going on at LOTS than this holding action, however. The facility is also creating a diverse networked environment. The various VAX systems running University of California at Berkeley Unix 4.2, the IBM 4381 running VM and a collection of a dozen or more types of workstations from DEC, IBM and Sun Microsystems, Inc. all tie into each other and to remote networks via an Ethernet network supporting the Transmission Control Protocol/Internet Protocol (TCP/IP).

Although TCP/IP is a complex protocol, it was, Gorin says, absolutely critical to achieving the kind of widespread connectivity essential for LOTS users. Beside the selection of protocol, the choice of network technology pales into insignificance, he says. "TCP/IP," he explains, "gives us access to the marvelous world of Internet, which means that, from the terminal in my office, I'm able to talk to a computer at MIT as easily as I can to one in the next building."

Selection of these protocols has meant venturing outside the mainstream DEC product line. But then, he says, the goal is not to be wedded to any single type of equipment but rather to guarantee access for whatever type of equipment will run the software needed and perform most suitably for the task at hand.

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DEC: EUROPE, UNITED KINGDOM

Europe pioneers reorganization

BY AMIEL KORNEL
European Bureau Chief

GENEVA — DEC's trans-Atlantic offshoot, planted almost a quarter of a century ago, has yielded much more than additional revenue for the firm. Its flourishing European operations are prompting DEC to refine global corporate strategy and organizational policy.

Invigorated by a 1982 corporate restructuring and the development of products that are well-tuned to European needs, DEC International (Europe) is looking stronger than most U.S. companies overseas.

"All the factors seem to have gone right for DEC during the last three years," says Peter Tobias, high-tech specialist at BIS Makintosh Ltd., management consultants in London.



Peterschmitt

DEC started out in Europe in 1963 with the creation of its West German

subsidiary, Britain was added in 1964, and the U.S. firm extended its turf to France the year after. By 1967, the organization was bringing in annual revenue of about \$10 million, or roughly 20% of worldwide sales.

Present now in 16 countries, DEC's European operations account for 30% of total sales. More than 20,000 people work at the national subsidiaries in more than 200 sales and service offices, seven technology offices and nine manufacturing plants.

By 1982, the firm felt that only restructuring could save it from buckling under the weight of its own growth. Unlike the U.S., where DEC competes in a homogeneous market, Europe's fragmented economic and political environment was creating additional pressures. European managers felt frustrated by what they saw as chronically slow response from U.S.-based executives too insensitive to the problems and issues facing the European units.

"Europe pioneered the reorganization because of stress due to the complexity of dealing with these countries and 15 product lines," says European Chairman Jean-Claude Peterschmitt.

The man behind the transformation was DEC Europe's President, Pier Carlo Falotti. "He was the driver," a DEC official in West Germany says. "He went to the states, pointed to the increasing European revenue and said, 'We need more freedom.'"

As of July 1982, DEC Europe management shifted emphasis from product lines to country markets. The national units were given greater freedom and responsibility. The Geneva headquarters now concentrates on defining strategic marketing objectives. Steering group committees meet quarterly.

"In Europe, we moved to decentralized profit and loss responsibilities," explains Bruno d'Avanzo, Geneva-based vice-president for marketing in Europe. "We found out you don't have to have a reporting line to make things happen."

And happen they have. Officials back in Maynard, Mass., are watching, sometimes enviously, as Falotti adroitly carves out ever bigger slices of the European computer market and lays claim to

a growing share of corporate revenue. In fact, DEC Europe's restructuring effort was so successful that the U.S. operations implemented similar changes the following year.

For the fiscal year ending in June, DEC's European subsidiaries showed an average 25% growth rate compared with the previous year. Sales at the U.S. organization grew 14% during the last fiscal year. Although declining dollar exchange rates partly masked European growth, Europe now accounts for 30%, or nearly \$2.3 billion of total revenue.

Despite the diversified country strategy, the European headquarters continues to intervene in transnational sectors, such as the telecommunications and automotive industries. Telecommunications, in fact, is another area where DEC Europe has had a forceful corporate role to play. The European units are championing the company's commitment to industrywide standards in general and to the International Standards Organization (ISO) model in particular. "ISO is fundamentally a Europe-driven concept," d'Avanzo notes. "ISO adoption was actively promoted by the European group and brought in by the U.S."

As DEC steps up its forays into telecommunications, the company may break into the emerging market for value-added networks. In Europe, where the liberalization of telecommunications services and equipment markets has begun, this area could represent an important source of revenue for DEC.

But contrary to rival IBM, DEC has been reluctant to speak out on the deregulation debate currently rocking the European state-run Postal Telegraph and Telephone authorities. "It's not really our business," d'Avanzo says.

Nonetheless, Peterschmitt acknowledges, "We support people who are in a position to deregulate."

This discrete but pragmatic approach characterizes most of DEC's European expansion. Twenty-three years after arriving on Europe's shores, the U.S. firm has blended into the corporate landscape and gained the trust and admiration of a growing population of European users. "To increase our total corporate presence in Europe has been my major drive," Peterschmitt says.

More important, DEC's technology and marketing seem to suit the demands of Europe's cautious users. Salesmen are content to sell low-end systems to a new client rather than push bigger solutions right away. "They grow systems on a site," says Martin Hingley, senior consultant at market researchers International Data Corp. (IDC) Europe in London. "The user has come to expect that his application could grow with his increased requirements," BIS Makintosh's Tobias adds.

According to IDC Europe, DEC sold 13% worth of the small-scale systems shipped in Europe in 1985, up from 9% the previous year. Last year it could claim 10% of that installed base, coming in a close second behind IBM's 11%.

At the higher end of the minicomputer market, DEC shipped 10%, according to value, of the systems sold in 1985, rising from 8% the year before. Its share of the installed base in Europe amounted to 11%, against IBM's 25%, according to IDC.

Although some DEC officials warn of a possible slowdown in the European computer market in the next 12 months, they retain their optimism. Analysts generally agree. "They seem to have things in place for them to do very well this year," Hingley says, "and to continue to do so."

DEC at center of Big Bang

BY STEPHEN ARKELL
Computer News

LONDON — DEC computers will be at the heart of the "Big Bang" expected to rock London's financial community on Oct. 27.

Big Bang is the name given to the official deregulation of London's stock market. The effect so far has been to encourage larger financial institutions, in particular the U.S. banks, to buy up British stock brokerages in the hopes of grabbing a slice of the new, enlarged market expected after October.

Estimates of the money spent over the past 18 months on acquiring new systems to help speed trading in what is known as the "post-big-bang environment" range from \$1.5 billion to \$15 billion.

At the epicenter of the Big Bang will be the London Stock Exchange; at the center of the exchange will be DEC computers.

The exchange is developing a major system to go on-line in October, which it calls Stock Exchange Automated Quotes (SEAQ). SEAQ is part of the exchange's thrust to become one of the major players in the current move toward global stock trading. It is spending approximately \$120 million on gearing up with a mixture of systems from vendors that include Modcomp Systems, Data General Corp. and IBM, as well as DEC.

Basically, SEAQ was designed to enable the 30 market makers that will be trading stocks after the Big Bang to report current prices for those stocks to the London Stock Exchange. The exchange will then be able to release that information to other market makers and information providers like Reuters, Quotron and Telerate. In the long run, it will be those firms that pay for the investment in the form of tariffs for information received.

Mick Newman is in charge of SEAQ and the exchange's 100-strong Information Services Division project team. "The deal with the government was to stop minimum commissions — what the layman might call price fixing," Newman says. "But it has become a catalyst for total change. It has opened the whole market, and it's unthinkable for most of us if it doesn't work."

Newman's department is spending approximately \$6 million on extra equipment, most of it from DEC, and an additional \$11 million on people and software.

In addition to SEAQ, the money is also being spent on upgrading the exchange's other information services, Epic and Topic.

Epic's twin PDP-11/785s are being upgraded to VAX 8650s. A further upgrade is being made to the buffer that links the information providers to Epic; that machine is moving up from an 11/750 to an 11/785.

"What we're basically doing is setting up a screen system so you don't have to go on the trading floor," Newman says. "Initially, we're expecting around 20 transactions a second, so we're reasonably happy with 5 million instructions per second."

Nobody can reasonably predict how market volumes will increase after the Big Bang. The working premise is that

At the epicenter of the Big Bang will be the London Stock Exchange; at the center of the exchange will be DEC computers.

volume could double or triple. Some market makers are worried about the implications if the stock exchange itself has got its bottom lines wrong. Newman admits that he will be looking very hard at the high-end 8800 DEC launched earlier this year as demand, and his budget, increase.

Another problem Newman has had to face is keeping his staff, given the upward spiral of DP salaries in London's financial community. DEC experience is at a premium because many institutions are using DEC machines for their vital communications and transactions systems.

At the end of last year, the exchange took the drastic measure of circulating a hands-off-our-DP-staff memo among member firms and offering its staff financial incentives to stay.

As for service, Newman is fairly happy with DEC UK. "We're not absolutely wedded to DEC," he says, "but it's much better for transaction processing." He rates DEC's support service as the yardstick by which he measures other manufacturers.

However, he is not slow to chastise the company on its sales and marketing efforts, particularly in the financial field. As he says, selling to cookie manufacturers involves a different style than selling to a bank.

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DEC: NORWAY, AUSTRIA

Fast growth, slow profit

BY KNUT IVAR SKEID
Computerworld Norge

OSLO — DEC's subsidiary in Norway is the company's second fastest growing unit in Europe, behind the subsidiary in Spain. For the 1986 fiscal year, revenue grew by 43%, rising to \$54.5 million.

Although this performance makes DEC the fastest growing minicomputer vendor in Norway, profits remain poor. For 1986, earnings were at only

\$306,000, a profit margin of less than 1% of sales. This figure was better than the previous year, when the company was \$931,000 into the red.

As of the end of June, Digital Equipment Corp. A/S has 291 employees. It maintains no production or research facilities in the country. Traditionally, DEC in Norway has been synonymous with scientific and educational environments as well as with the Norwegian oil industry in the North Sea.

The latter might be one of the biggest threats to the firm's continued fast growth because the recent fall in oil prices has almost halted capital investments in that industry. Although DEC Norway sources say they have not yet been affected by the oil industry slow-

down, others see a difficult road ahead.

Per Holte Rosenkilde, manager of market research firm International Data Corp. in Norway, says, "I think DEC is facing a hard time in the next months if the oil prices continue to be as low as today."

The firm's technical image has made it difficult for DEC Norway to penetrate the office automation market, even though the firm has directed a great deal of resources into this area, including a Norwegian translation of All-In-1.

Another threat comes from Norsk Data A/S, Norway's leading computer vendor. Norsk Data has been very successful in northern Europe in recent years, placing second in the Norwegian market after IBM and posting about

DEC's subsidiary in Norway is the company's second fastest growing unit in Europe.

three times the revenue of DEC.

"Our strength, compared with DEC in Norway, comes from our office automation solutions," says Bjorn Boberg, marketing manager for Norsk Data. "We rarely meet competition from DEC in this area, but we meet them more often in the technical market."

External R&D signs up scientists

BY PETER FAERBINGER
Computerwelt Oesterreich

VIENNA — The need to look toward the future and anticipate new developments in information technology is one of the most important responsibilities of every high-tech company.

DEC is aware of the need to respond to these demands. "We must have new technology at our fingertips in order to do so," says DEC management.

European research institutions and universities are a major source of knowledge and expertise. That is why DEC has contacted them for assistance in creating the European External Research Program (EERP).

EERP's purpose is to promote the exchange of technical expertise among DEC and European research organizations by identifying critical areas of potential interest to the company.

Research projects will not be actively solicited without signs of prior interest from one of DEC's research and development groups.

The exchange of information broadens DEC's research focus and helps it gain additional knowledge, perspective and product-oriented results, a DEC official explains.

In return, the external research organization gets DEC support in the form of equipment allowances. The size of the overall grant is not fixed, and any research institution may participate in the program.

Since one of the objectives is to maintain established contacts, institutions that have used DEC equipment and developed a certain level of expertise in specific fields of interest will be at an advantage.

The research results can be used by DEC free of charge, but the copyright of the work remains in the hands of the author or institution.

DEC is not authorized to sell the product to customers, and the research organization may still market the product or give it away.

So the product itself is not the reason for EERP's existence. Very often, the value of research work will not be visible for many years, nor is return on investment immediately known.

The key element in the program is the proposal for research work on a specific topic. Upon receipt of a proposal from an institution, the next step is to find a DEC sponsor. The sponsor will directly benefit from the research results and must oversee the project's management.

In Austria, EERP is responsible for

four projects: "Time-Based Methodology for Real-Time Systems" by Prof. Herman Kopetz, Institute for Practical Computer Science/Technical University, Vienna; "Artificial Intelligence Tools for Management of Distributed Data Bases" by Prof. Erich Neuhold, Institute for Informatik/Technical University, Vienna; "Mathematical Expert Systems" by Prof. Bruno Buchberger, Institute for Mathematics, University of Linz; and "Process Numerical Simulation Software" by Siegfried Selberherr, Institute for General Electrical Engineering and Electronic/Technical University, Vienna.

Selberherr began his research seven years ago and has maintained a close

The exchange of information broadens DEC's research focus and helps it gain additional knowledge, perspective and product-oriented results.

relationship with DEC — first with DEC U.S., which was building the Microvax II chip, and now through the EERP and DEC Vienna.

Selberherr helped develop the Microvax II chip through his simulation program dealing with semiconductor device modeling, process modeling for semiconductor device fabrication, circuit simulation, analysis of integrated circuit interconnect capacitances, computer-aided design (CAD) for integrated and hybrid circuits and CAD for surface acoustic wave devices.

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DEC: SWITZERLAND

Success strains Swiss operation

BY MARTIN MEIER
Computerworld Schweiz

ZÜRICH — The high quality of its products has made DEC successful in Switzerland, but the firm is having trouble keeping up with its own rapid growth. The relationship with OEMs and value-added resellers (VAR) has been strained at times, and finding sufficient numbers of qualified personnel has been a headache.

In fiscal 1986, which ended June 30, DEC Switzerland posted revenue of \$188 million. Although the 1985-1986 annual growth rate of 23% is well above the industry average, it represents a decline in growth compared with the boom years of 1984 and 1985.

DEC Switzerland's revenue in fiscal 1984 increased 31%, and in 1985, sales grew 50%, placing DEC among Switzerland's 250 biggest firms in terms of revenue.

Hans-Wolfgang Dirkmann, general manager of DEC Switzerland, claims to be satisfied with the pace of the firm's growth. "Projections for 1986 are higher still," he says. "We have no difficulties in obtaining orders. We even allow ourselves to turn down orders containing too high a level of technical risk."

But success carries its own perils. "Our main problem," Dirkmann says, "is how to find new employees."

In the mid-1970s, fewer than a dozen people were employed in the headquarters near Zurich, selling and servicing PDP-11 computers. Now there are more than 800 employees, and the company has sales and service offices in Zurich, Basel, Bern, Geneva and Lausanne.

During the last fiscal year, more than 200 new people were hired, and the company expects to take on another 200 in 1987.

DEC Switzerland recently bought 26,000 square meters of land in Dubendorf, near Zurich, for the construction of a new headquarters with room for 800 employees.

In Switzerland, the company has won a strong position in the market for small and medium-size multiuser systems. According to Framingham, Mass.-based market research firm International Data Corp., DEC ranks second in sales of computer systems priced under \$100,000 and designed for up to 15 users.

This success largely is derived from the Microvax II. DEC sold 15% of the units in this category that were shipped in Switzerland during 1985 and had a 19% market share in terms of value. IBM leads with 18% of unit shipments and 26% of sales value. In the market for computer systems worth more than \$100,000, DEC comes in a distant third behind IBM and NCR Corp.

Dirkmann would not give a breakdown of the firm's Swiss revenue by applications sector but points to process control, manufacturing, banking, government and the army as strong vertical markets. The greatest growth in orders has come from banks, he says.

In Switzerland, DEC sells much of its equipment through OEM's and a growing number of software vendors and claims a 75% share of the Swiss OEM market.

A small number of vendors, howev-

DEC ranks second in sales of computer systems priced under \$100,000 and designed for up to 15 users.

er, obtain their DEC computers from the American gray market — brokers who provide faster delivery and lower prices on DEC equipment without the support offered by DEC — much to the annoyance of DEC Switzerland.

Some software packages sold by DEC in Switzerland are produced under license from Swiss and West German systems houses. Decfinanz, a financial package, comes from software vendor Systime AG (unrelated to the UK firm of the same name); VAX-Profi, computer-

aided design and manufacturing software, is produced by West Germany's Datanorm; and Decbanque ABI was developed by a group of Swiss banks.

But DEC is also continuing to expand its own software catalog. Earlier in the year, Swiss VARs and OEMs voiced resentment over DEC's forays into software development. A cut in the firm's discount rates also riled more than a few OEMs and VARs.

"The times are gone when the OEM companies used to make money with

DEC hardware without added value," Dirkmann says.

But the firm's strained relationship with its sales partners seems to have improved. According to A. Zaengerle, director of Zurich-based OPM Gemeinschaft fur Organisation Planung Management AG, the competition from DEC outweighs any negative aspects because the market is stimulated. He says that OEMs end up benefiting from DEC's increased publicity.

Hans Frick, director of EDP Support AG in Schwerzenbach, Switzerland, expresses doubt that DEC can further expand its software development activities in this country for the simple reason that there is not enough qualified personnel to go around.

"In view of the situation on the job market, this would not even be possible," he says.

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DEC: SWEDEN, DENMARK

Ericsson, DEC planning venture

STEFAN KARLEBO
Computer Sweden

STOCKHOLM — Ericsson Information Systems, Inc. and the Swedish DEC, Digital Equipment AB, are negotiating a possible joint venture in the banking systems market. Although an agreement was hoped for by this summer, negotiations are still under way.

"At this moment, nothing is obstructing any agreement between our company and DEC," says Nils-Ingar Lundin, Ericsson's vice-president of public relations. "We have both a lot to gain from such an agreement."

Ericsson will be responsible for delivery of terminals, printers and other office automation equipment. DEC will take care of the computing power.

"Our target is to strengthen our position as leading supplier of products, systems and services in the field of communications," says Stig Larsson, chief executive of Ericsson Information Systems AB. "A joint venture with DEC as a partner will give us the opportunity of developing banking systems on a larger geographical market. The cooperation with DEC does not imply any changes in product development. The 2500 and 2199 series will continue to be developed."

In the future, though, Lundin says, the 2500 system could be developed together with VAX machines.

"We are very positive regarding a joint venture with Ericsson, and we hope this will facilitate a breakthrough on the Swedish market," says Bo Dimert, chief executive of Digital Equipment AB in Sweden. "Our hope is to reach an agreement which will help to develop products that fit one another. In the future, this would perhaps lead to a joint product development."

In Sweden, DEC passed the one-billion line in Swedish krona (U.S. \$130 million) on July 1, 1986.

"The positive development of DEC's shares in the U.S. is a sign that things are going the right direction all over the world," Dimert says. The turnover [revenue] grows faster in Europe than in the U.S. In Sweden we have an increase of about 30%."

Since January, Digital Equipment AB has introduced five new computers — the VAX 8200, 8300, 8500, 8800 and the GPX engineering workstation.

"We feel the demand is good," Dimert says. "The balance of costs and revenue is difficult to maintain in an expanding business, but now we control the situation." Last year revenue increased by 28%, and analysts expect the growth to continue.

"We are confident for the future," Dimert asserts. "Our installation at the Swedish parliament has been tremendously well received. This will probably have some multiplication effects."

The success DEC enjoys is a result of the decisions made by the management of the parent firm some years ago when it was decided to focus research and development on 32-bit machines.

The decision to stop the future development of the Decsystem-20 was not well received among computer people within DEC. Many people were astonished, but their product line is more consistent and compatible now.

During the 1970s, DEC enjoyed a steady increase in revenue and profits. This trend was broken in 1983 when the

revenue fell about 32% and rumors spread that AT&T would take over DEC. But today DEC has replaced its VAX line with a second-generation family. The company is now fighting successfully with IBM on the commercial as well as technical and scientific markets.

"It's often easier to connect two IBM mainframes to one another via a VAX than directly," one user says.

The development of the VAX processors and their VMS operating system was such a massive, complex job that Dimert is "convinced we lost money on every product during the first year, never mind the accountants' opinions."

"It seemed we were the last in the world to create a 32-bit processor, but we created for the future," he says.

"The VAX line is expanding from small desk computers to big computers that can handle the biggest MIS systems."

Big image lacking in Danish market

BY LARS OLSEN
Computerworld Denmark

DEC Denmark is located in a market place unlike any other in Europe: The country lacks one big, local computer vendor. For that reason, Denmark has become Europe's most loyal IBM market. However, DEC has managed to reach record growth figures, with an annual growth rate of 40% to 50%.

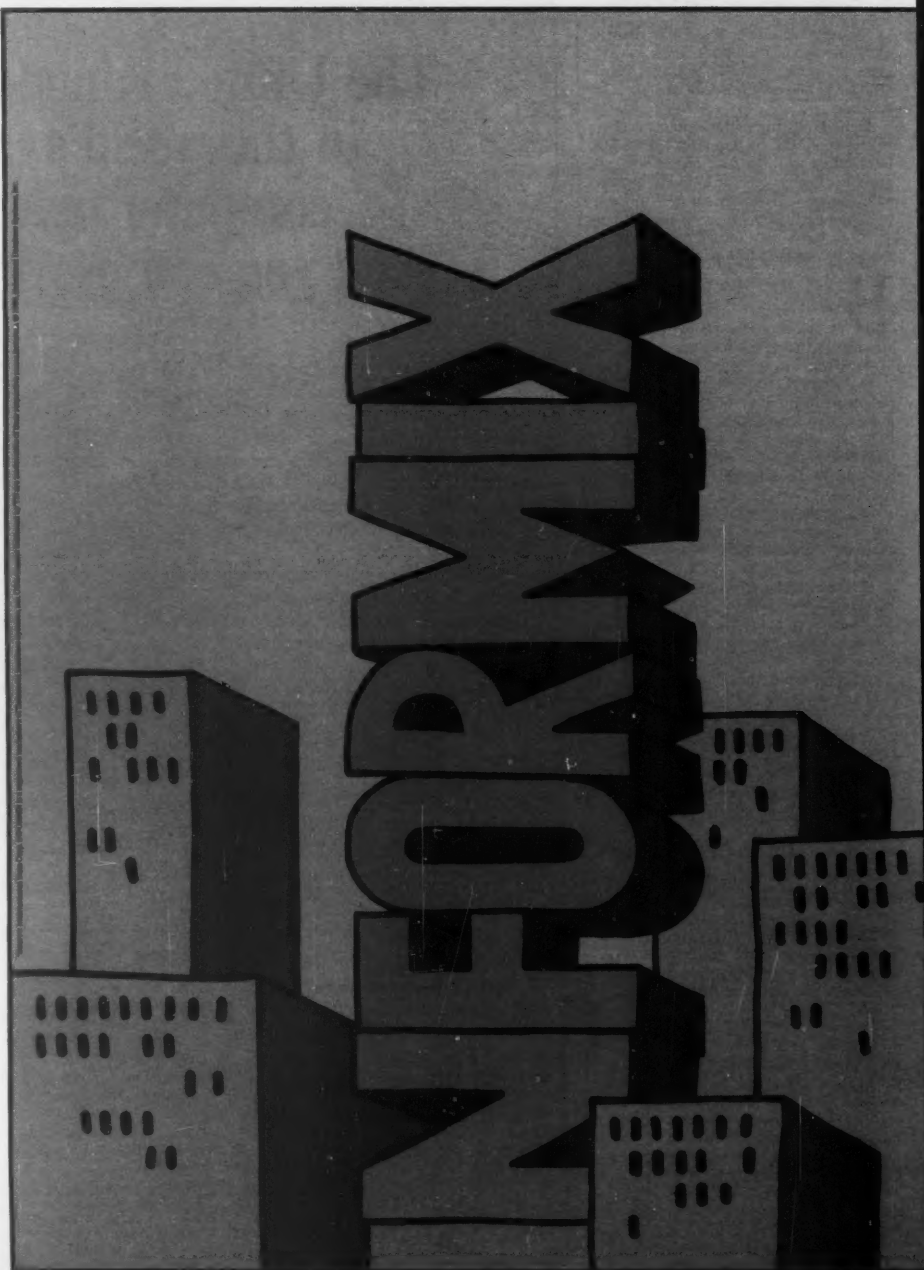
But this booming growth, which in every respect exceeds the average of Danish computer companies as a whole, is quite unknown to the public, as is the existence of DEC Denmark. The compa-

ny keeps such a low profile that seeing a DEC advertisement is quite unlikely.

"We are operating in the same market as IBM, which is among the biggest and most important Danish concerns," says DEC Marketing Manager Axel Donsby. "It is necessary for us continuously to expand — get critical mass — if we want to keep the reputation among the Danish trades and industries as a serious working partner delivering quality service."

At the time of the establishment of DEC Denmark in 1975, the company based all its activities in the OEM market and the university sector. The firm's first-year figures showed an annual revenue of \$1.2 million; in 1979, the figures reached \$3.4 million.

From that time on, things began to happen quickly. Fiscal year 1984-'85 results reached \$40.1 million. Figures cov-



DEC: DENMARK, FRANCE

ering the 1986 fiscal year ended June 30 showed revenue of about \$54 million.

In view of the impressive growth rate of DEC Denmark, it may seem peculiar that there has been no profit generated. Donsby explains, "We are allocating almost all of our resources toward expansion while maintaining quality. This... act is necessary for us to keep the status of a serious partner. Besides, it means that our staff annually expands at 20%.

"In fact, our engagements with people for new established jobs are quite as numerous as IBM's — one new employee every third weekday," Donsby says.

Besides being a well-established supplier to the private business sector, DEC Denmark has succeeded in other areas, too. In Denmark, the government sector is very large, so a company's success based only on the private sector is not worth mentioning. Therefore, it is of

particular interest to DEC Denmark to be recognized as a major supplier to the state-owned computer organization, Datacentralen.

According to market research firm International Data Corp.'s figures for 1985 vendor shipments, DEC Denmark's share of the multiuser systems small-scale market was 8% in a total market worth \$123.5 million. In the medium-scale market, the company had a 10% share of a total market value of \$137.5 million.

Donsby offers the following explanation for DEC's success in Denmark:

"Time works for us. Market trends indicate network solutions, and we are able to offer the kind of products that will meet the increasing demand. Besides, we — particularly in relation to IBM — take a great advantage in the increasing downsizing trend."

France seeks staffing answer

BY GERARD BIDAL
Le Monde Informatique

PARIS — Experiencing a 20% to 30% annual growth rate for the last three years, DEC France has begun to make significant qualitative and quantitative changes in its personnel hiring and development strategy.

DEC France has limited the hiring of young university graduates because it cannot mobilize the necessary training resources.

DEC France devotes 9% of its total payroll budget to internal training.

Unlike other computer makers, such

as IBM, that recruit mostly inexperienced applicants, DEC hires experienced engineers who can be operational immediately.

In 1985, only 20% of newly hired engineers were inexperienced. This figure applies on the average for other DEC affiliates worldwide.

But finding able managers has been difficult. The firm's rapid evolution has tended to favor decentralized management, leaving managers to a large extent on their own in making decisions. As a result, job candidates must prove that they are capable of taking risks and of handling responsibility. Such strict recruiting constraints limit the number of applicants in an already restricted market.

To solve this problem, the firm is using a novel in-house training program to rapidly bring inexperienced recruits up to par.

DEC France received more than 15,000 unsolicited applications in 1985. These serve as the main source for finding new employees.

A system of pinpointing dossiers by simple coding of the job profile and the resume helps to match candidates to job offers.

Special recruitment days are periodically organized for young graduates. In France, they are held in the spring or at the end of the year and are open to applicants who have had four or five years' of post-secondary education, been to a *grande école* — a French equivalent to an Ivy League school — or a business school.

The candidates are interviewed initially by a psychologist and two executives — most often a training director and a software or sales manager.

The selected applicants will be enrolled in the firm's in-house training program, known as DEC College. DEC College emphasizes theory as well as practice.

Generally, there are two classes of approximately 12 people each year who participate in a 10-month apprenticeship, which consists of four months of theory as well as on-the-job training. The final stage in the training program involves placement in one of the firm's departments, with DEC College acting as an internal employment agency.

Training alone, however, cannot answer the firm's personnel needs. Faced with the constant demand for managers and unable to increase the number of new employees in the company with qualified applicants, DEC has favored internal promotion.

But strong internal mobility can be disruptive in a company, and DEC hopes, with its training program, to progressively raise the number of young graduates it hires to the level that other manufacturers have achieved.

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Where it all began: DEC's first computer, the PDP-1, was released in 1960. PDP stands for program data processor — a designation chosen to hide DEC's entrance into the computer field, which was viewed as lacking sales potential.

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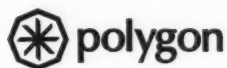
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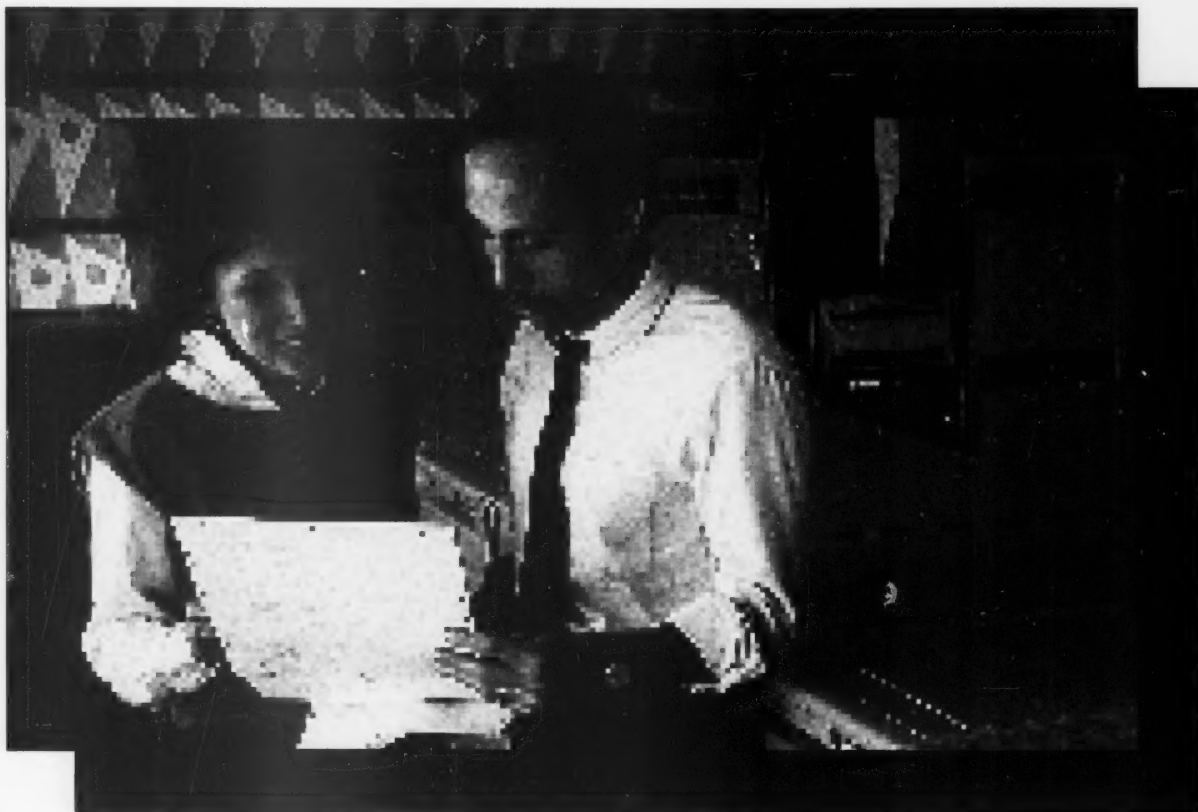
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